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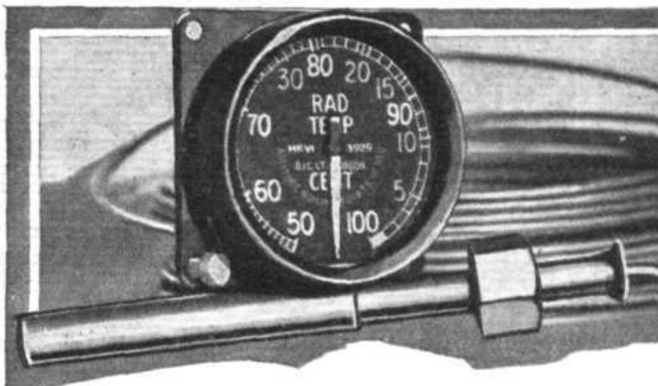

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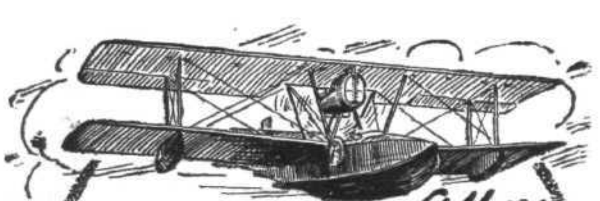

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Founder and Editor: STANLEY SPOONER

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CONTENTS

DIARY OF CURRENT AND FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in this list—

1929.

May 23-June 8	**Royal Tournament, Olympia.**
June 7	**Entries close for King's Cup Race.**
June 9	**Cambridge Air Meeting (Marshalls).**
June 10-11	**Cambridge Aero Club Display, Conington v. Aerodrome.**
June 19-22	**F.I.A. Conference, Copenhagen.**
June 27-30	**Rotterdam International Air Meeting.**
July 5-6	**King's Cup Race and Siddeley Trophy Tour.**
July 13	**R.A.F. Display at Hendon.**
July 16-27....	**7th International Aero Exhibition, Olympia.**
July 25	**Bleriot Cross-Channel Flight Anniversary Fete, Calais.**
July 28	**International Flying Meeting, Sweden.**
Aug. 1-14....	**French Light Plane Meeting, Orly.**
Aug. 15	**International Balloon Race, Poland.**
Sept. 6-7	**Schneider Trophy Race, Solent.**
Sept. 10-20	**Aero Club de France Meeting, Le Baule.**
Oct. 1	**Gordon-Bennett Balloon Race, St. Louis, U.S.A.**
Oct. 31	**Guggenheim Safe-Aircraft Competition Closes.**

EDITORIAL COMMENT

WATCHING the modern tendency to "boost" the engines used in light aeroplanes, the cynic might be forgiven for asking "Whither are we heading"? We began, as far as the present light 'plane movement is concerned, with engines of about 60 h.p., after deciding, rightly or wrongly, that 1,100 c.c. capacity was unlikely to produce useful types of machines. Gradually the power was increased to 70 h.p., 80 h.p., and nowadays it has reached the 100-h.p. mark. While the demand for performance is very natural, and the increase in performance is most easily obtained by an increase in power, it is well to bear in mind that these things have a habit of growing imperceptibly; each step is but small compared with the previous type. But if, instead of basing one's comparison upon the last type of engine one goes right back to the original type, the jump becomes much more startling, and one suddenly wakes up, so to speak, to a realisation that, without being aware of it, the old ideal is by way of being forgotten.

Real Progress

We have often pointed out that the ultra-low power machine is never likely to become really popular in this country. The private owner of an aeroplane, of whatever type, will not be content with something which is of no practical use and merely fit for cruising around in the immediate neighbourhood of an aerodrome. He will most certainly want something on which he can travel across country at a reasonable speed. So far all are probably agreed. But it is just in deciding what is "a reasonable speed" that there is room for disagreement. Obviously, no hard-and-fast rules can be laid down, and doubtless there will be, in the future, room for quite a variety of light 'plane types and powers. For example, we do not for one moment suggest that the light 'plane two-seater as we know it to-day will ever lose popularity. The type has definitely come to stay, and its popularity will continue to increase. But just as on the roads to-day those who cannot afford a motor car turn to the motor cycle with or without sidecar, so in the air there will be a large demand for lower-

powered and cheaper aeroplanes. The simile of the motor-cycle should not, perhaps, be pushed too far, but it serves very well, inasmuch as it calls attention to the probability that more than one class of low-powered machine is likely to be wanted. Not all motor cyclists use the two-wheeler because it is cheaper. Many use it because it is more "snappy," more convenient, more "at one" with the driver. And at the same time, it *is* inexpensive. So one may imagine that during the next few years we shall see various classes of low-power machines produced, some with cheapness mainly in view, some with high performance, and some combining these with comfort for the occupants.

That it will not be necessary to use high powers to get even a very good performance is indicated by a new machine described and illustrated in this issue of FLIGHT. The A.B.C. "Robin" designed for A.B.C. motors by "Tony" Fletcher, has an *estimated* top speed of 105 m.p.h. True, it still remains to be seen whether this figure is realised, but it is unlikely that it is very far wrong. This top speed corresponds to a maximum engine power of 40 b.h.p., and as the total loaded weight of the machine will be 680 lbs., the Everling "High-speed figure" works out at approximately 20. Although good, this figure is by no means the maximum ever recorded for a machine. For the de Havilland "Tiger Moth," for example, the Everling "High-speed figure" is 26. There is thus no reason to doubt that the estimated top speed is attainable.

Thus we have a machine which will exceed 100 m.p.h., at any rate for short periods, and which will cruise comfortably at something like 85 m.p.h. using but 25 h.p. or so. At that power and speed the mileage is more than 40 miles per gallon. We have been privileged to see the performance curves of the "Robin" (estimated, of course), and the machine is calculated to require rather less than 10 h.p. to remain in the air. One result of this is that the initial rate of climb is very good, probably not a great deal short of 1,000 ft. in the first minute. It is not so very many years ago that such a rate of climb was associated with machines of the single-seater fighter type, although it is now, of course, very far exceeded by that class of machine.

The point is that we are now about to have available a class of machine which, although it will probably be marketed at a little more than £400, does give a very good performance, both in speed and climb, and yet should be extremely economical to run. And to this must be added that, with the enclosed cabin and *conduite interieure*, the pilot should be as comfortable as in any motor car.

Altitude Record Claimed

THE German airman Neuenhasen, flying a Junkers aeroplane at Dessau, established what is claimed to be a new height record of 12,500 m. (about 40,625 ft.).

Seaplane Record Claimed

ALL existing speed records, it is reported, for service seaplanes were shattered on May 25 by Lieut. W. T. Tomlinson, of the United States Navy, who covered a 100-mile course over the River Potomac at an average speed of 175·01 m.p.h.

View from an Air Liner

THE atmosphere over South-east England was so clear on Wednesday week that the pilot of an air liner on the London-Continental air route could see the whole of Kent, Surrey, and Sussex beneath him. It was possible to see the whole of the coast line from Clacton-on-Sea to Beachy Head.

Mr. R. L. Robbins and Mr. J. Kelly with their Ryan monoplane (Wright "Whirlwind" engine) in which they set up an endurance record (under refuelling conditions) of 7 days 4 hrs. 40 mins. 15 secs., or 22 hours above the previous record. They are ex-cowboys!

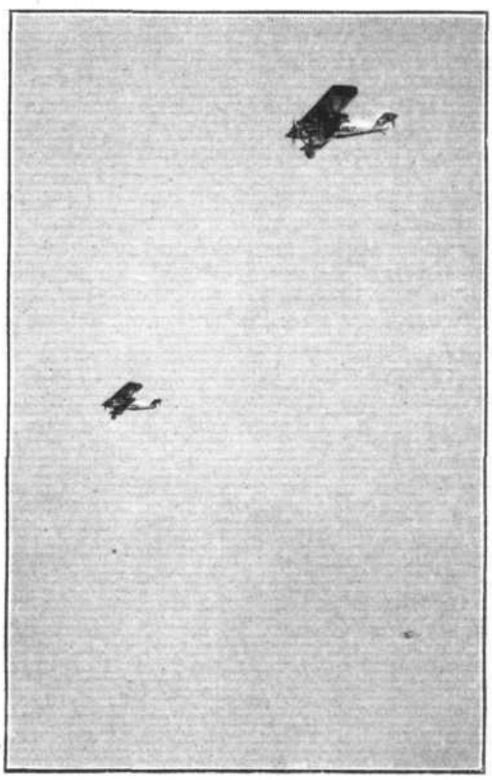
Flt/Lt. C. L. Lea-Cox, 56 Fighter Squadron.

THE SASSOON CUP

A GOOD race, with a close finish, marked this year's race, on May 28, for the Sassoon Cup—one of the few Service sporting air events held for pilots in the R.A.F. It is a handicap cross-country race between the various Fighter-Squadrons for a trophy presented by Sir Philip Sassoon.

This year the race started and finished at Northolt, and the course lay via North Weald, Hornchurch, Biggin Hill, Kenley and Brooklands, a total distance of 100 miles. A new feature was introduced this time in the handicapping, which brought out an element of skill on the part of pilot and crew apart from actual flying and performance of the machine. Pilots and crews were placed 100 yards from their machines, which were empty of fuel and oil, and with one wheel detached. On the word " go " they ran to their machines and had to pump in the fuel and oil (Bowser pumps being provided) and fix the wheel. The time taken to get the machine ready for flight counted in the handicap allowance in the race itself.

Twelve squadrons were represented and these were as follows: No. 1 Tangmere, Sqdr.-Ldr. E. O. Grenfell (Siskin IIIa.s-c); No. 3 Upavon,

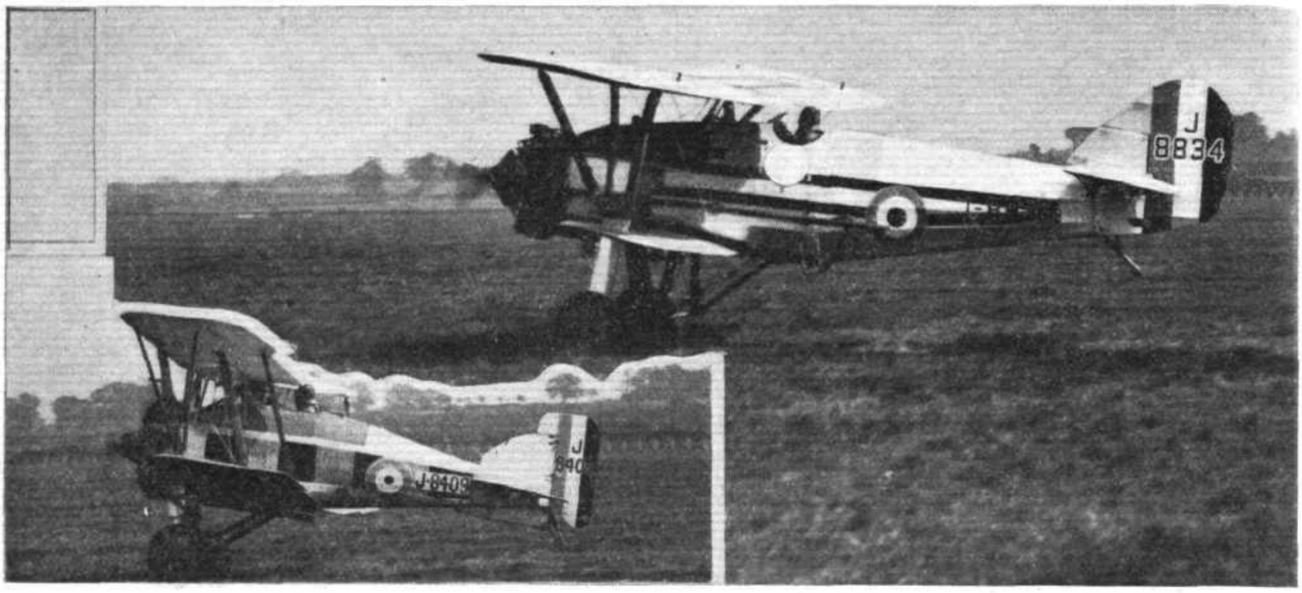


Flight-Lieut. H. W. Taylor (Gamecock " Jupiter "); No. 17 Upavon Flight-Lieut. F. H. Woolliams (Siskin); No. 19 Duxford, Sergt. Parsons (Siskin); No. 23 Kenley, Sergt. Freeman (Gamecock " Jupiter "); No. 25 Hawkinge, Fying Officer G. P. Macdonald (Siskin); No. 29 North Weald Flying Officer J. Clarke (Siskin s-c); No. 32 Kenley, Flight-Lieut. C. F. Le Poer Trench (Siskin); No. 41 Northolt, Flying Officer H. T. Andrews (Siskin s-c); No. 43 Tangmere, Pilot Officer H. H. Leech (Siskin); No. 56 North Weald, Flight-Lieut. C. L. Lea-Cox (Siskin s-c); No. 111 Hornchurch, Sqdr.-Ldr. F. O. Soden (Siskin s-c). The Siskins were fitted with Armstrong-Siddeley " Jaguars," both supercharged (s-c) and unsupercharged.

The competitors started, in order of handicap, at 3.30 p.m., and were soon out of sight of the 'drome. While they were away we were treated to one of the best demonstrations of " crazy flying " that we have seen by the two pilots, Flying Officer Campbell and Flight-Sergt. Brown of Digby, who will give this item at the forthcoming R.A.F. Display; they were flying Avro-Lynx machines. We will not describe here (even if we could !) what these two pilots did

[" FLIGHT " *Photographs*

THE **SASSOON CUP. (Below) The line-up of Siskins and Gamecocks representing 12 Fighter Squadrons,** and **above the finish, showing Flight-Lieut Lea-Cox, No. 56 Sqdn. (left), and Flying Officer Clarke, No. 29 Sqdn. (right), both on Siskins, with but 2 seconds "between them."**



["FLIGHT" Photographs

"SISKIN" v. "GAMECOCK": The two types represented in the Sassoon Cup: left, the Gloster "Gamecock" (Bristol "Jupiter") piloted by Sergt. Freeman (Kenley), and, right, the Armstrong-Whitworth "Siskin IIIa" (supercharged "Jaguar") piloted by Sqdr.-Ldr. E. O. Grenfell (Tangmere)

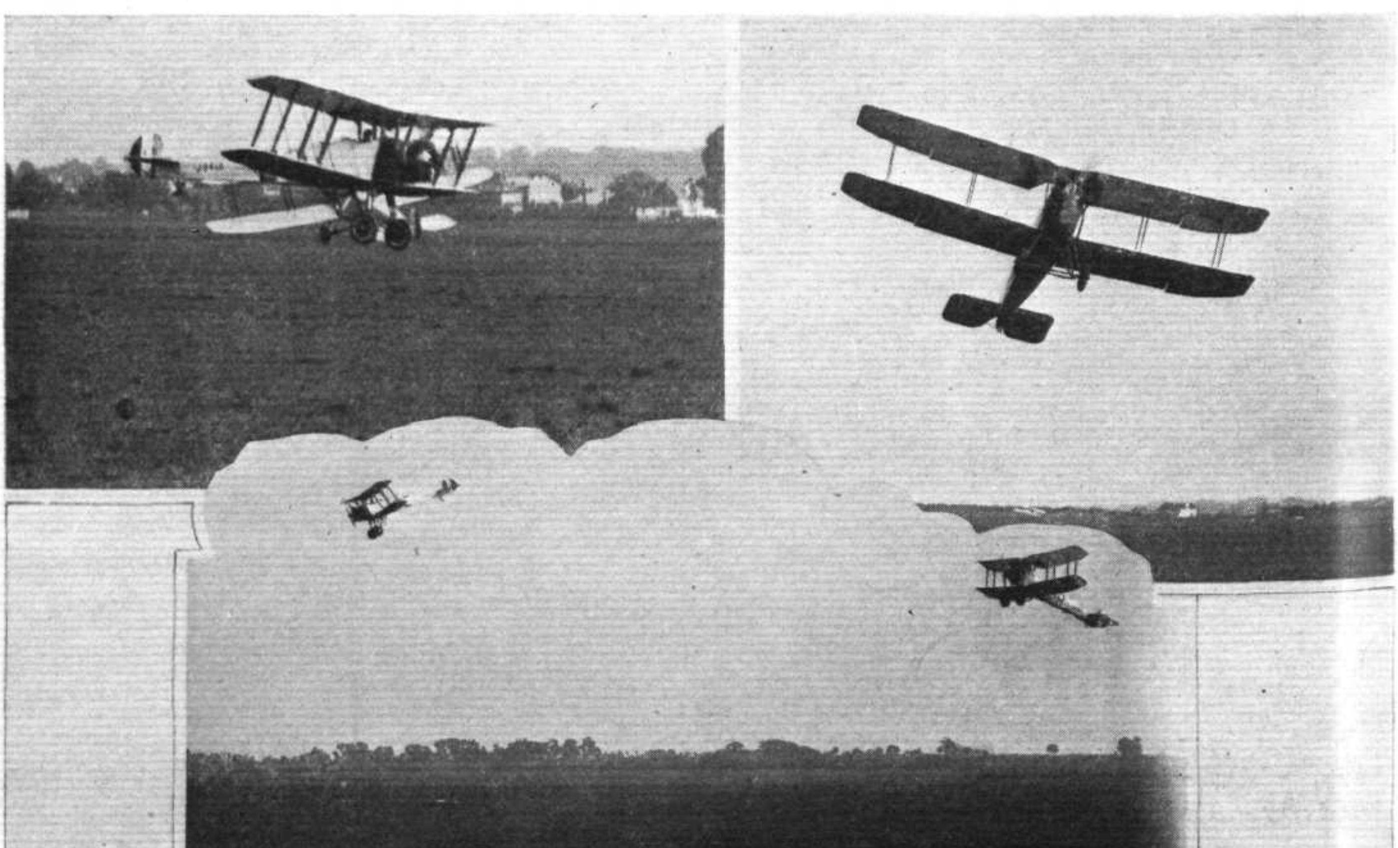
and did not do with their mounts as this would spoil the treat in store for spectators at Hendon on July 13. We can, however, promise some extremely remarkable and thrilling manœuvres, quite new and equally impossible.

When their display was over, Sqdr.-Ldr. F. P. Don—who pilots the Prince of Wales—gave a fine demonstration on a slotted "Moth," and helped by a stiffish wind, hovered and stalled on a remarkable manner.

This over, all eyes turned in the direction of the returning "Fighters," which were now due back. Two specks, close together were soon spotted, and in no time these crossed the line, side by side, with only 2 seconds difference between them. They were Flight-Lieut. C. L. Lea-Cox (No. 56 Sqdn.) and Flying Officer J. Clarke (No. 29 Sqdn.), who were placed first and second respectively. Both kept close together over the whole course, and averaged a speed of 146 m.p.h.

Then, at short intervals, the remaining ten came in, in the following order :—(3) Flying Officer Andrews (No. 41), (4) Sergt. Freeman (No. 23), (5) Flight-Lieut. Le Poer Trench (No. 32) (6) Flying Officer Macdonald (No. 25), (7) Flight-Lieut. Woolliams (No. 17), (8) Flight-Lieut. Grenfell (No. 1), (9) Sergt. Parsons (No. 19), (10) P/O Leech (No. 43), (11) Sqdr.-Ldr. Soden (No. 111), (12) Flt.-Lt. Taylor (No. 3).

Sir Philip Sassoon, the donor of the cup, was unable to be present, but Air Vice-Marshal Sir Edward Ellington (Air Officer Commanding Air Defences, Great Britain) ,and Air Vice-Marshal F. R. Scarlett, Officer Commanding Fighting Area, were among other R.A.F. officers witnessing the race.



["FLIGHT" Photographs

"CRAZY FLYING" AT NORTHOLT: Three studies of "Air-Madness" on the part of Flying-Officer Campbell and Flight-Sergt. Brown on Avro-Lynx machines

ANOTHER "CIRRUS" SUCCESS.

Mr. Wen Lin Tschen and Mr. Christian Johannsen arrived at Amoy, CHINA, on May 12th, having flown from Croydon in a CIRRUS-AVIAN.

This flight is further proof of the Reliability and Efficiency of the "CIRRUS" engine, already demonstrated by previous successful world flights, such as :—

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LONDON—CAPETOWN—LONDON (Lt. R. R. Bentley, A.F.C.).
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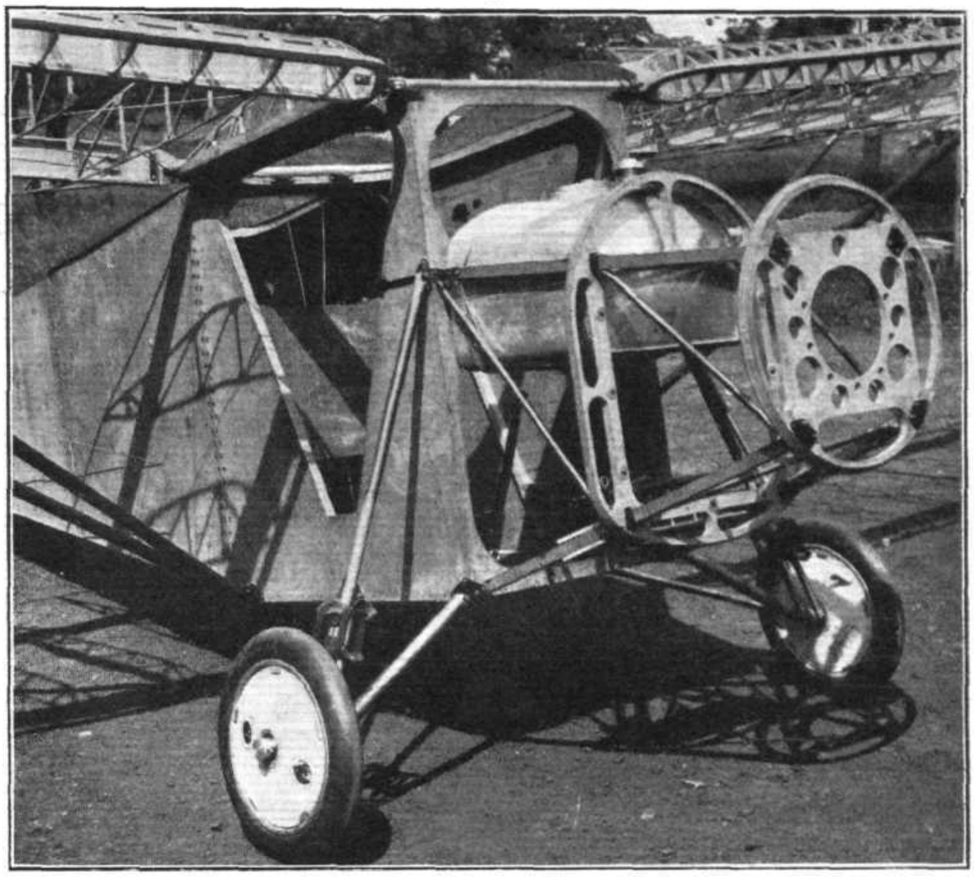
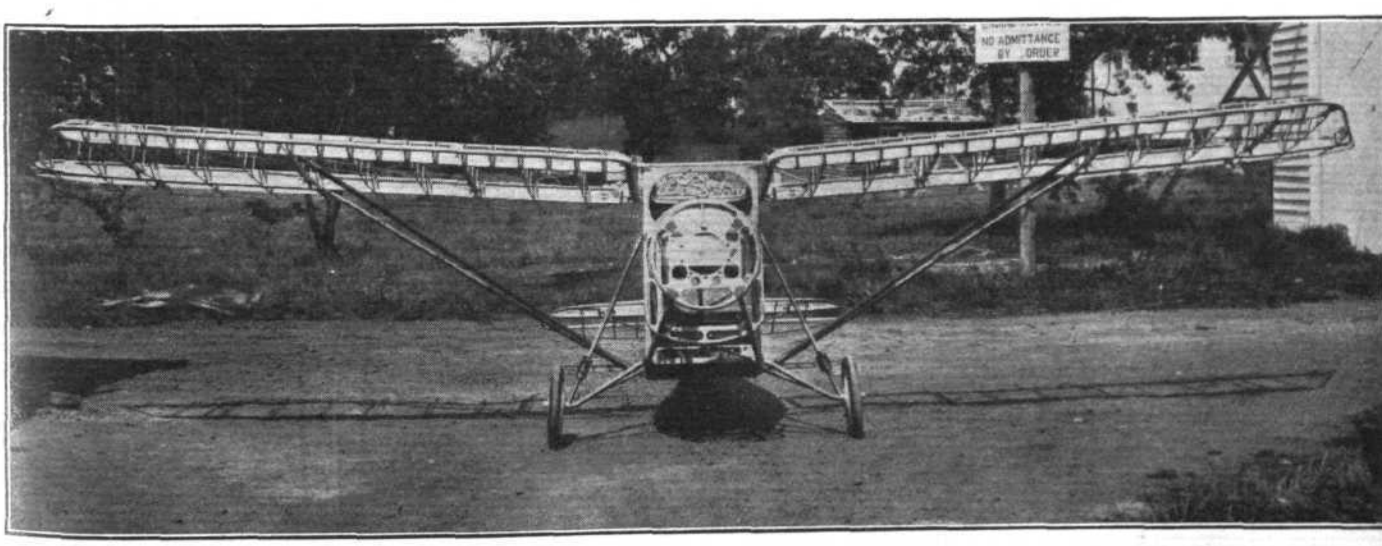


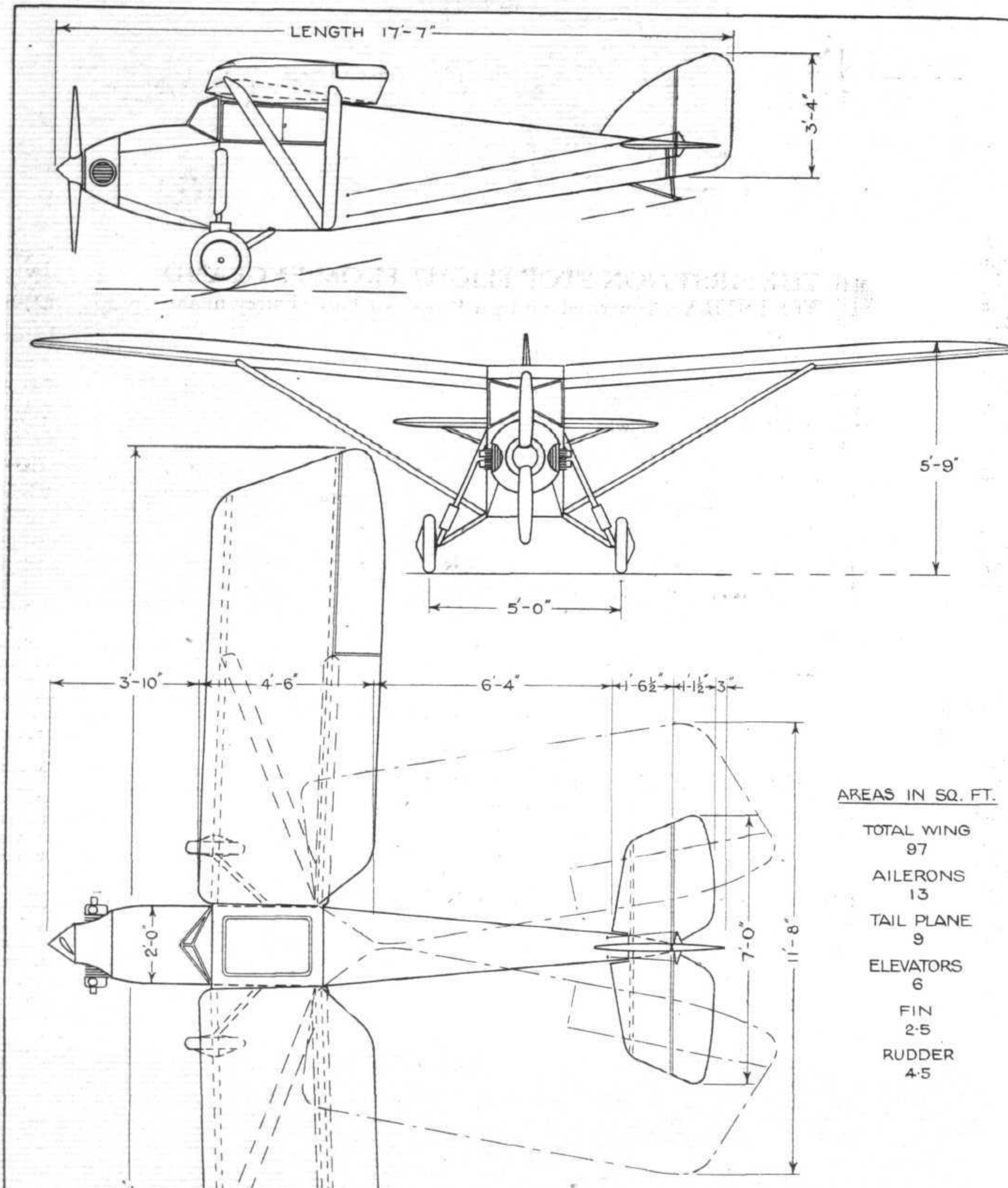
SLOWLY but steadily the little "Scorpion" engine, designed and built by A.B.C. Motors, Ltd., of Walton-on-Thames, has been gaining popularity for use in low-power light 'planes, until at the present time it is to be found in most European countries, such as France, Germany, Austria, Italy, Poland, etc., not to mention places as far afield as Australia and New Zealand. At home, owing to the absence so far of machines specially designed for really low power, the market has been more restricted, but there is ample evidence that during the next few months quite a large number of machines will make their appearance, fitted with this popular power plant. Some of these will be exhibited at Olympia, while others may not be ready in time for the show but will come out later in the year. Already it is obvious that 1929 will in future be remembered as the year in which the cheap, low-power, single-seater, light 'plane was first seriously put on the market in England. The light 'plane of 30 h.p. or so is, of course, no novelty, and was produced in a variety of versions several years ago, but that was as a result of competitions intended to encourage the production of machines of this class. The light 'plane development in this country has followed lines very different from those originally contemplated, but we are now definitely returning to the real light 'plane via a somewhat roundabout road. This time, the revival of the type is not caused by competitions but as a result of the realisation of a demand which undoubtedly exists. That we in this country shall ever go to the same extreme as have the Germans, and design for a maximum of 20 h.p. or so is very unlikely. A spectacular performance is not required, but a useful turn of speed will without doubt be demanded, and the machine which is capable of making good over the ground a speed of 50 m.p.h. only against quite an average head wind will never, we feel sure, attain any degree of popularity in this country. Nor is there any very logical reason for such a machine. The difference in production cost between an engine developing a maximum of some 20 h.p. and one capable of close upon twice that power is relatively small. And as for running costs, the 40-h.p. machine will be very little more expensive to run than the 20 h.p. Yet the extra power is sufficient to enable a really useful performance to be attained.

Mr. T. A. Dennis, managing director of A.B.C. Motors, has long realised the truth of what FLIGHT has been "preaching" concerning the need for a low-power single-seater machine, and becoming somewhat impatient with the slow progress made, he decided some time ago to enter the field of aircraft construction and to build machines to utilise the two types of engines which he was already producing; the 30–40-h.p. "Scorpion" and the 60-70 h.p. "Hornet." Looking around for a designer, Mr. Dennis secured the services of Mr. A. A. Fletcher, whose name will be familiar at least to the older readers of FLIGHT. "Tony" Fletcher was, back in the "dark ages," connected with the Martinsyde firm, and later with the L. & P. school at Hendon and the Central Aircraft Company at Kilburn and Northolt. Afterwards he joined the Whitehead company, and some years ago he



["FLIGHT" Photographs

FRONT VIEW OF THE A.B.C. "ROBIN": Although showing the machine in skeleton, this photograph gives a good idea of the clean lines. The illustration at the top of the page shows in detail the engine mounting, undercarriage and cabin.



THE A.B.C. "ROBIN": General Arrangement Drawings of a new low-power single-seater.

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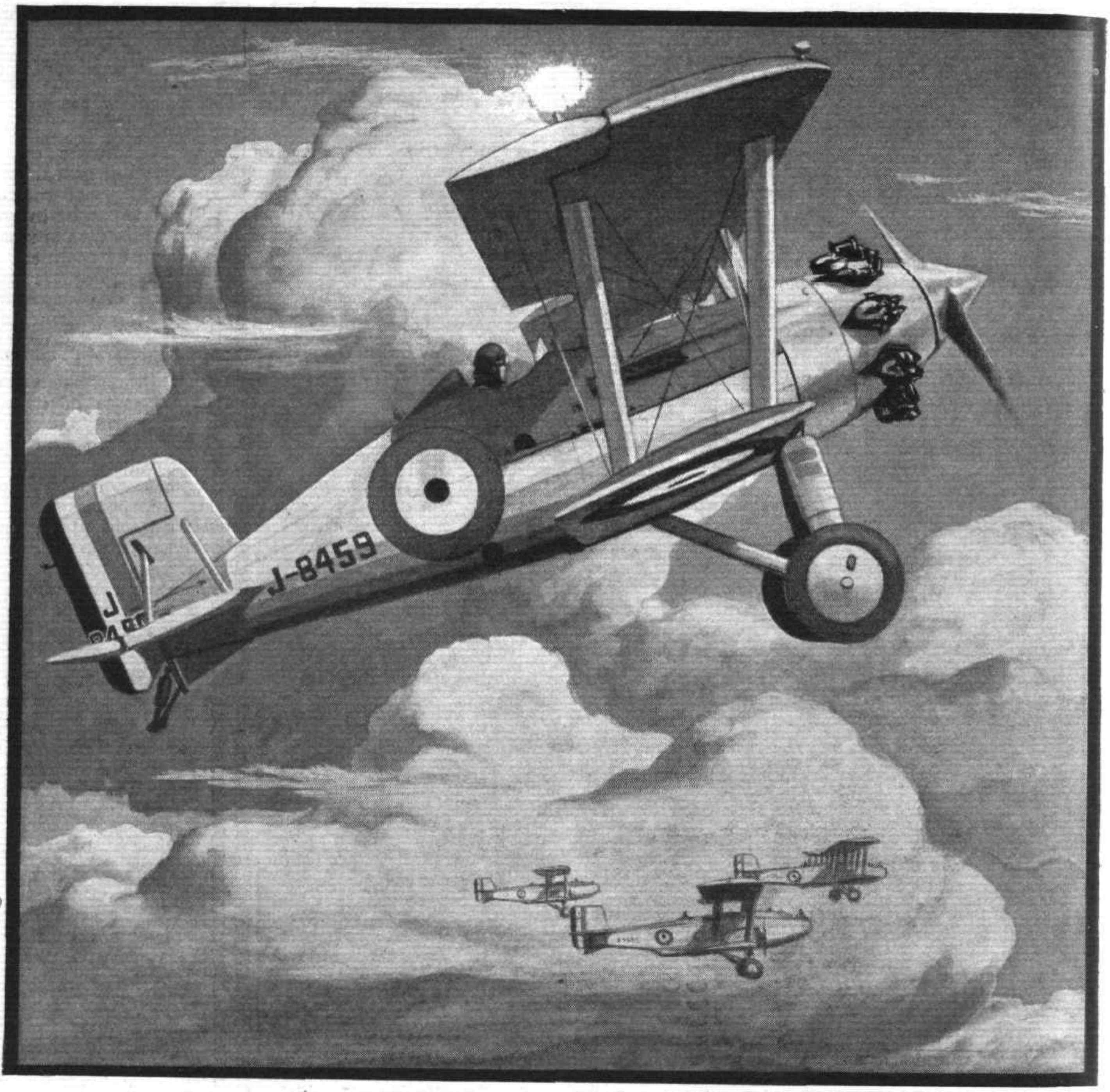
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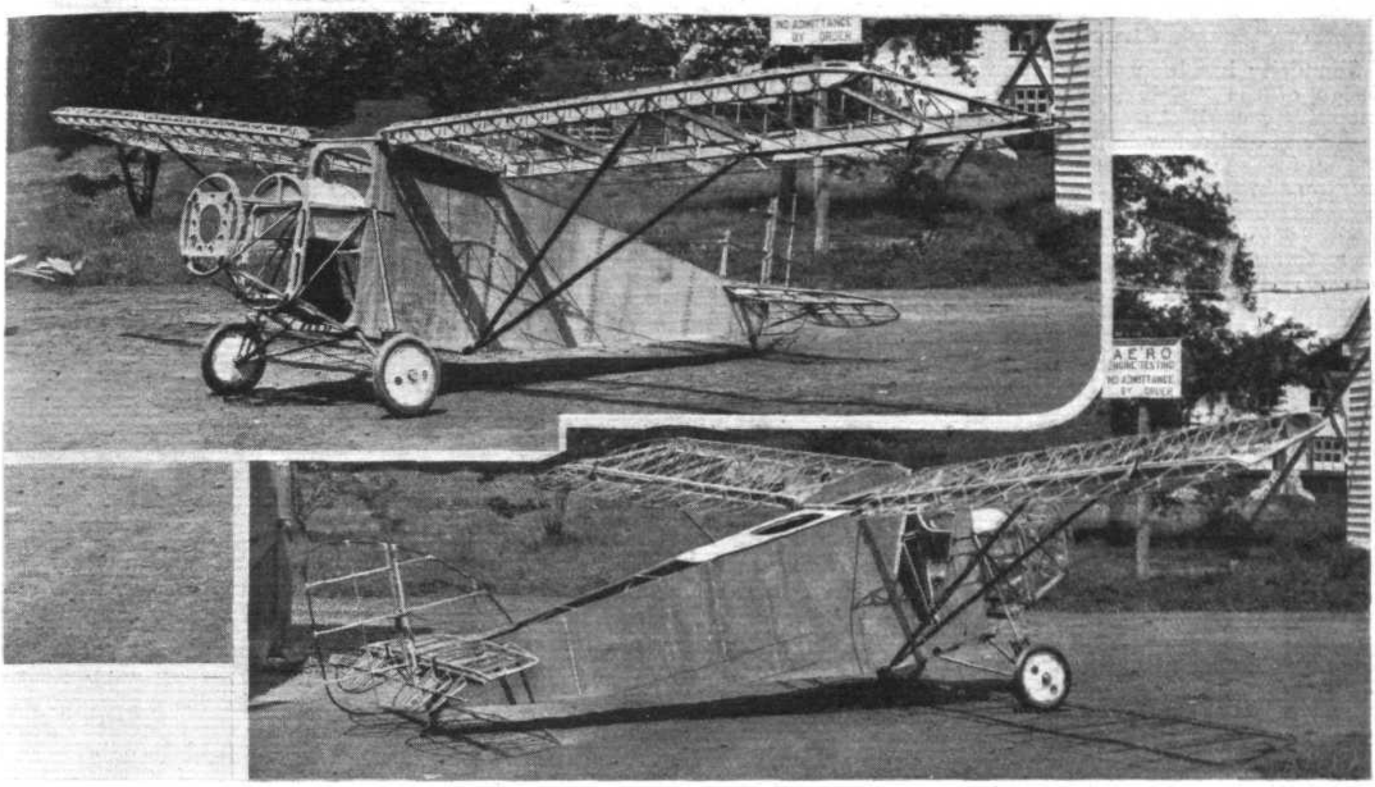


["FLIGHT" Photographs

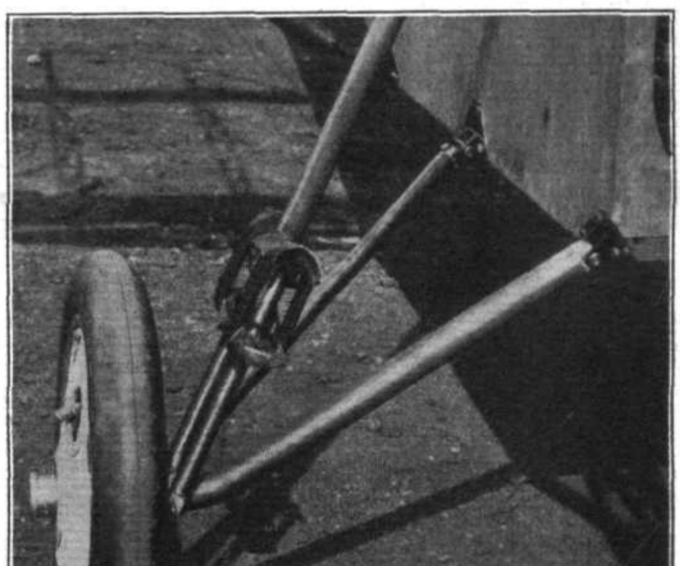
Three-quarter front and three-quarter rear views of the "Robin" in skeleton.

went to Japan whence he was driven by the earthquake that wrought havoc with so much property. Mr. Fletcher has thus had a very long experience of aircraft design under varying conditions, and the first machine which he has designed for A.B.C. Motors is the little monoplane that forms the subject of the present notes and illustrations.

The A.B.C. "Robin," as the first machine is to be named, is of more than ordinary interest in that it is the first low-power single-seater with *conduite interieure* to be produced in this country. The comfort of the pilot (who will in most instances be the owner) has been seriously studied, and in the "Robin" we have a machine which the owner can use all the year round without having to don special flying kit. The little cabin has its floor so low above the ground that the pilot (one feels he ought to be called the driver) can step in without the use of any built-on steps. Large windows on each side give a good view outwards and, as the windows can be opened, backwards during flight as well as forward while taking off and landing. In fact, as "Tony" Fletcher put it " if he is a sufficiently bad pilot he can watch his wheels until the actual moment of touching the ground." A V-shaped windscreen closes the cabin in front, and as the engine mounting is placed quite low, the view forward is also excellent. A hinged skylight forms the roof of the cabin, and can be raised to facilitate getting in and out, as well as forming an emergency exit through the roof in case of a crash. The cabin door itself is on the starboard side.

Just behind the cabin, and with a hatch in the roof of the fuselage, is a luggage compartment large enough to take two large suitcases, so that the owner of a "Robin" will be able to go on a prolonged tour carrying with him changes of suits, linen, etc., in addition to the proverbial toothbrush.

That the "Robin" will be a really useful and serviceable machine, and not merely a toy fit only for "tootling around an aerodrome," will be realised when we state that the estimated top speed is 105 m.p.h., while the machine should cruise very comfortably at 85 m.p.h., taking but 24 h.p. from the engine. The fuel consumption at cruising speed is but 2 gallons per hour or so, giving a mileage of more than 40 miles per gallon, which must be regarded as extremely economical. Taking the price of petrol as 1*s.* 7*d.* per gallon, the "Robin" would, in still air, do about 85 miles for a fuel cost of 3*s.* 2*d.*, or, in other words, at the rate of less than ½*d.* per mile! We believe that large operating companies reckon the fuel cost as being approximately one-third of the total running cost. Whether the same applies to a small machine like this is, perhaps, open to doubt, but assuming that it does, the *total* running cost of a "Robin" should be less than 1½*d.* per mile! Flying threatens to become cheaper than third-class railway travel. When small machines of this class become really popular, as they are bound to become very soon, the most serious item of expense is likely to be the insurance.



["FLIGHT" Photograph

The "Robin" undercarriage is of the "split" type, and comprises axle, radius rod and telescopic strut. The shock absorbers are endless rubber rings on "crutches."

Structural Design

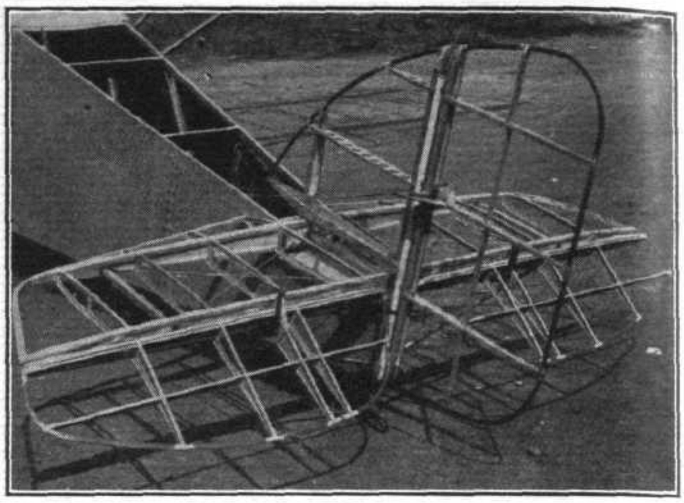
Simplicity has been aimed at in planning the structural design of the "Robin," and wood is the material most extensively used, the employment of metal being confined to fittings and a few highly-stressed parts.

The fuselage is a wooden "box" having four spruce longerons in the corners, and top, bottom and sides covered with a thin ply-wood veneer. Light formers are placed at intervals to retain the rectangular cross-sectional shape, these formers consisting of panels with very light spruce frames and thin ply-wood walls lightened by large cut-outs.

Up to the cabin the fuselage is deep and the deck forms a roof except for the skylight already referred to. In front of the cabin, however, the deck drops considerably so as to provide the forward opening of the front window or windscreen. The lower longerons extend right up to the engine plate, but owing to the sudden drop in the deck in front of the cabin, the top longerons of the engine mounting are short separate lengths, stopping short at the front wall of the cabin. The engine plate itself is a multi-plywood former, and is attached to the longerons by rather neat steel fittings, which are simply short lengths of square-section steel tubes, split for a distance along the corners, and the free ends thus formed being turned out at right angles. In this way a flanged socket is formed without the use of welding. The diagonal bracing of the forward part of the fuselage, *i.e.*, from cabin to engine plate, takes the form of steel tubes. The petrol tank, with a capacity of 8 gallons, is housed in the forward deck fairing, above the pilot's legs, a position which still gives sufficient "head" to enable direct gravity feed to the engine to be employed.

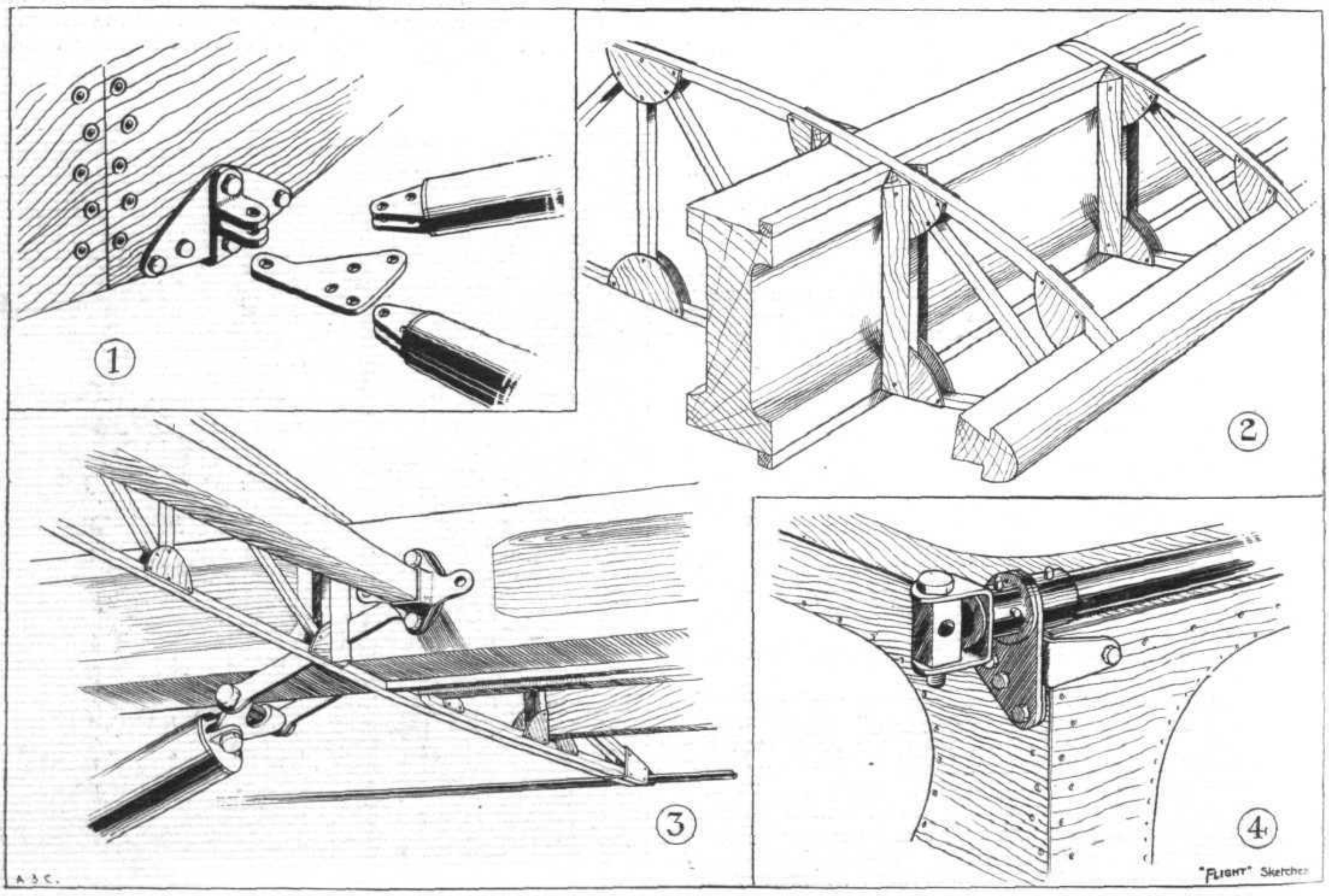
The monoplane wing is built in two halves, hinged to the fuselage top corners, and braced each by a pair of struts arranged in the form of a Vee. The upper ends of the wing bracing struts are attached to the wing spars by steel straps, while at the fuselage end the two tubular struts have fork ends fitting over a sheet steel fitting bolted to the fuselage. As the lift is taken from this point, a steel strap bolted to the corner fitting runs right across the bottom of the fuselage to the corresponding fitting on the opposite side, while inside the fuselage a tie rod transmits the tension. This tie rod lies along a plane just above the top of the lower longerons, and as the external steel strap is just below the lower longerons, the whole structure is so stabilised that no twisting stresses are imposed upon the lower longerons.

Across the top of the fuselage runs a Duralumin tube, which terminates at each end in a sheet steel fork, between the jaws of which a Duralumin block is swivelled. This block, which is vertical, has a horizontal hole drilled through it for the reception, in the case of the front spar fittings, of the locking pin used in connection with the wing-folding



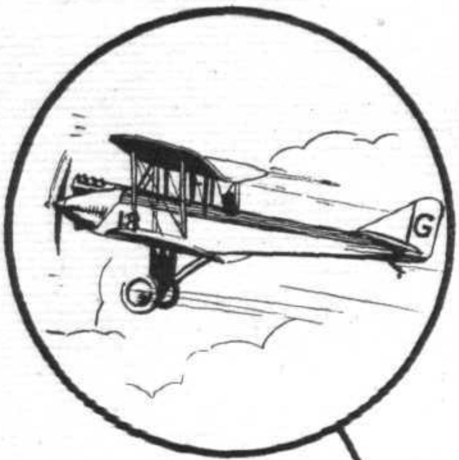
["FLIGHT" *Photograph*

The tail of the "Robin" is of orthodox construction and design.



["FLIGHT" *Sketches*

ON THE A.B.C. "ROBIN": The lift strut attachment to the fuselage is shown in 1, and details of the wing construction in 2. In 3 is illustrated the attachment of the lift strut to the rear spar, and in 4 the duralumin tube across the top of the fuselage, and which carries the fork and block for the wing spar attachment.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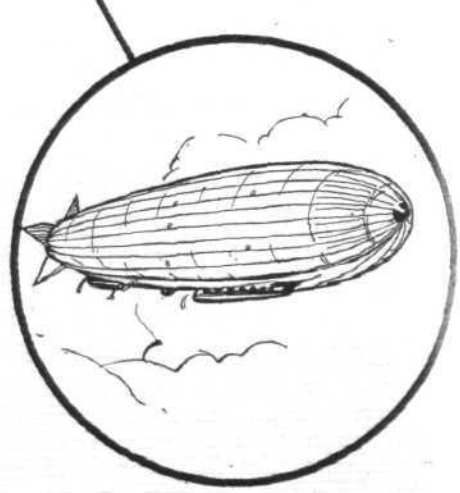
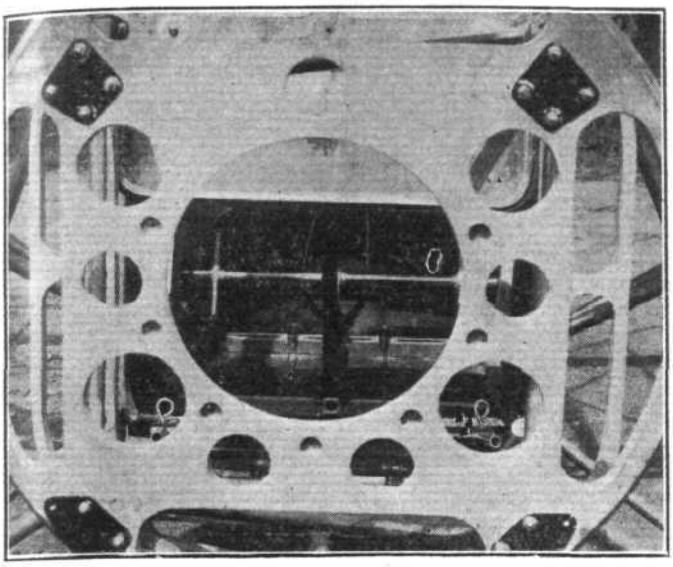




"FLIGHT" *Photograph*

An unusual view. This photograph was "shot" through an opening in the engine plate, and shows the control stick, adjustable foot rests, control cable pulleys, etc.

arrangement. This pin is rather in the form of a sort of key, as when the wing is erected and the pin pushed home and turned, it cannot accidentally come out of its socket, being held in by a coil spring and having a small projection or cam which fits into a corresponding recess in the block.

The wing spars are of solid spruce, spindled out to an I-section. This form of spar is rather cheaper to make than a box-section spar, and as there is no difficulty in obtaining good spruce in such short lengths, the spindled I-section spar was chosen. The ribs are light girders, of square-section spruce, attached to the spars by corner strips. The rib flange strips are joined to the rib tie strips by thin three-ply wood gussets. The covering is doped fabric. The wing section used is a bi-convex one, R.A.F. 34, which has an almost stationary centre of pressure, and has been found to work excellently on full scale.

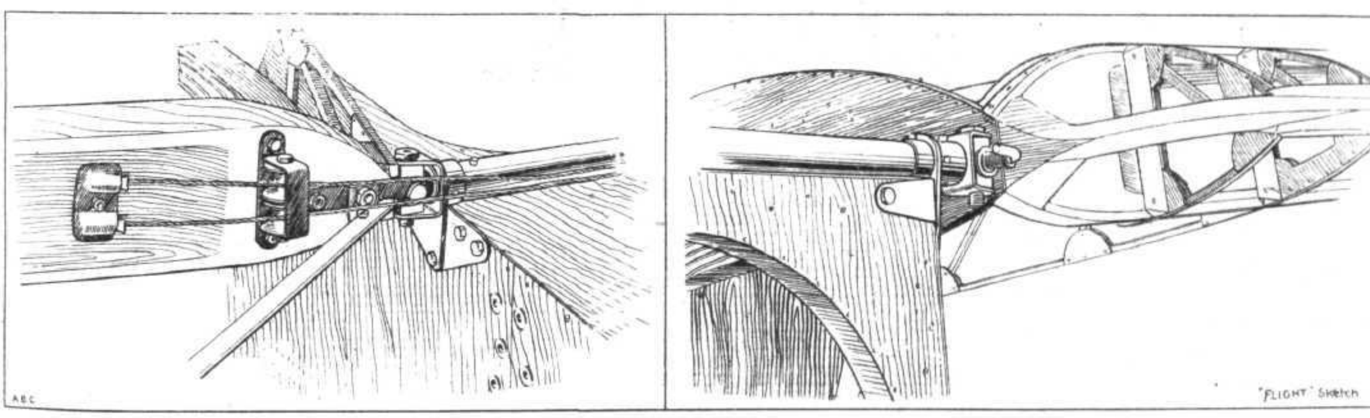
The tail surfaces are also of wood construction, and perfectly normal, both in aerodynamic and structural design. The tail plane incidence can be adjusted while the machine is on the ground, the rear spar of the tail plane being supported from the fuselage by two threaded bolts, lock nuts on which locate the tail plane at the desired angle by being tightened up against a flat sheet steel fitting.

The undercarriage is of the "split" type, the wheel on each side being supported on a bent axle, which is in turn located in a fore and aft direction by a radius tube, and in a vertical direction by the telescopic "leg," the upper end of which is bolted to the side of the fuselage. Endless rubber cord rings form the shock-absorbing medium, and the correct amount of springing is very simply determined by the number of rings employed. There is no damping device for checking bouncing. The wheel track obtained with this form of undercarriage is very wide, and there should be little danger of the machine turning over when taxying in a strong cross wind.

The main dimensions, etc., are shown on the general arrangement drawings. The estimated tare weight of the "Robin" is 415 lbs., but actually, the machine promises to come out quite a good deal lighter than that. The permissible gross weight for the certificate of airworthiness is 680 lbs., which will enable a fairly heavy pilot and a considerable load of luggage to be carried, in addition to fuel for 4 hrs. at cruising speed, or a range of about 340 miles.

Assuming a maximum power of the "Scorpion" of 40 b.h.p., the power loading is 17 lbs./h.p., while on normal power (35) the power loading is 19·4 lbs./h.p. The wing loading is 7 lbs./sq. ft., which gives a landing speed of approximately 40 m.p.h.

As the "Robin" is not yet finished, actual results of flying tests cannot be given, but the high placing of the wing, in conjunction with a wing section with stationary centre of pressure, should make for great stability. R.A.F. 34 shows no violent stall, and the machine should merely sink slowly when flying beyond the stall, and should show little tendency to go into a spin.



["FLIGHT" *Sketches*

THE A.B.C. "ROBIN": On the left, a sketch of one of the rear spar hinges, showing how aileron cables are guided. On the right, a front spar fitting, with locking pin.

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The Royal Tournament

H.R.H. THE QUEEN was present at the opening ceremony of the Royal Tournament at Olympia on May 23, and the Prince of Wales took a part as a soldier in the initial item and was also a spectator. This Tournament began with the usual triumphant acclaim, which included an inspiring massed bugle display by men from various regiments. Royal Hospital School boys, Greenwich, greatly impressed with their cutlass drill, and there was real novelty in the performance of the P. and R.T. School, Portsmouth, in which 80 men hauled themselves up 80 ropes and performed on high. Old favourites, like the musical ride of the Lancers, were as popular as ever. A Royal Air Force display of physical training was carried out at the double, with great credit to the R.A.F., from which one expects technical competence rather than massed ground action. Nevertheless, they prove themselves in this sphere the equal of the older Services. Much fun was made by the Tank Corps display, in which one tank, in the hands of an expert, acted like a wild horse. A wonderful final spectacle this year is carried out by the Middlesex Regiment. It shows how they won the Battle of Albuhera in the Peninsular War. It is an historical representation, most realistically produced, and is followed by other phases in the history of this famous regiment of "Die-Hards." Judging by the crowds now visiting Olympia, this year's Tournament is even more popular than ever.

Schneider Trophy Course

THE Admiralty is preparing the course for the Schneider Trophy race, which takes place on September 7, and the work of laying it out and arranging moorings for ships with spectators is being done by Capt. R. St. P. Parry, King's Harbour Master at Portsmouth. The official chart of the course, which is now completed, shows that the race will start and finish at Ryde Pier and the course will be 1,000 yards wide.

Graf Zeppelin Returns

THE Graf Zeppelin has flown back to Germany from the South of France, where it was obliged to make a forced landing recently. After a successful flight from Cuers, near Toulon, during which the four engines used worked faultlessly, and at times a speed of 75 miles an hour was attained, the airship made a smooth landing at Friedrichshafen at 5.10 a.m. on May 24. The French guests, most of them wearing uniform, were greeted by representatives of the German authorities, including an officer of the Fifth Reichswehr Division stationed at Stuttgart. A representative of the Wurtemberg Government again expressed thanks for the reception of the airship and her crew at Cuers, and a French naval officer replied, thanking Dr. Eckener for a delightful cruise. The airship travelled by way of Marseilles, the Rhone Valley, Geneva, Lausanne, Fribourg, Berne, and Kreuzlingen.

Australian Airmen Found

A WIRELESS message from Darwin, states *The Times*, reports that Capt. Brain, pilot of the Queensland and Northern Territories Aerial Services aeroplane "Atalanta," found the missing airmen, Flight-Lieut. Moir and Flying Officer Owen, at Cape Don lighthouse, on the mainland, opposite Melville Island, on May 26. They were slightly injured, and their machine, a Vickers "Vellore" ("Jaguar"), was damaged. The airmen apparently picked up and followed the light. A steamer, *Kyogle*, which is equipped with wireless, has taken the airmen to Darwin. Moir and Owen state that they mistook the Cape Don lighthouse for Port Darwin, and landed there in the dark. They had been living at the lighthouse without any means of communication with Port Darwin. Flight-Lieut. Moir and Flying Officer Owen were on the final stage of their flight from England, which they left on March 18, to Australia. They had been lost sight of since May 18. After arriving at Bima, on the Island of Sumbawa, Dutch East Indies, on May 17, they left the next day for Port Darwin, a flight of nearly 1,000 miles. They were sighted over Koepang, Timor Island, about 350 miles from Bima, the same night, and after that all trace of them was lost. Search was immediately made over a wide area. Capt. Grosvenor, A.D.C. to the Governor of South Australia, who was on a solo flight round Australia, the Dutch and Portuguese authorities, the steamer *Kyogle*, and, finally, the Queensland and Northern Territories Aerial Services, engaged in a combined effort to find them.

["FLIGHT" *Photograph*

Flight-Lieutenant J. Moir (Right) and Flying Officer H. Owen, who flew to Australia from England in the Vickers "Vellore" biplane fitted with an Armstrong Siddeley "Jaguar" engine. Their arrival on the Australian coast on May 18 was unfortunately marred by a forced landing 180 miles short of their intended landfall, Port Darwin. Their entire flight took two months.

French Air Records

MAJORS GIRIER AND WEISS, two French air officers, claim a new record for the 5,000 km. (3,106 miles) closed circuit, previously held by Italy. They covered the circuit on May 25 at an average speed of 117 m.p.h. on a Brêguet machine fitted with a Hispano 600 h.p. engine. They were in the air for 26 hrs. 34 mins. The Italian record in this class was made by Capt. Ferrarin and Major Del Prete with a speed of 82½ m.p.h. Another French pilot, M. Lemoigne, claims to have reached an altitude of 31,168 ft. on May 23, with a machine carrying half-a-ton load, thereby setting up a new record for this class.

Endurance Record Made by America

Two American cowboys, Mr. R. Robbins and Mr. J. Kelly, have set up an endurance and long distance record under refuelling conditions in a Ryan monoplane fitted with a Wright "Whirlwind" engine. They were aloft over Fort-worth, Texas, for 7 days, 4 hrs. 40 mins. 15 secs., defeating the former record of 150 hrs. 40 mins. by 22 hrs. The latter time was made in the *Question Mark*, a Fokker three-engined monoplane belonging to the U.S. Army Service and flown by U.S. Army Service pilots, last January. It was on May 21 that the latest attempt started and it finished on May 28. Robbins and Kelly each won £1,000 and other prizes by their flight, which was a private venture. The machine, *Fortworth*, had already flown 50,000 miles when they bought it, and rebuilt it for their attempt. (*See* photo. p. 438.)

Australian Aerial Derby

ON May 25, the Australian Aerial Derby was flown over a forty-mile course, states a report from Australia. There were many entries, embracing various types of aircraft, and the winner was Mr. Stewart, of New South Wales, on a Cirrus-Moth. Mr. Farmer, of Victoria, was second on a Cirrus-Moth, whilst third place went to Mr. Littlejohn, of New South Wales, who flew a Cirrus-Widgeon. The winner's time was said to be 25 mins. 45 secs.

French Formation Flight

SEVENTEEN French military aircraft, in two squadrons, carried out formation flights when they flew from Paris to Mayence (Mainz) and back—a distance of 625 miles—in less than seven hours last week.

Parachute Descent

SERGT. ALLEGRET, a French army pilot, was thrown from his machine when it lurched suddenly in the air at a height of 20,000 ft. near Metz. He was wearing a parachute which opened safely and landed him without injury.

Indian Air Mail

A RECORD Indian air mail, consisting of over 30,000 letters, arrived at Croydon aerodrome on May 26, three minutes behind schedule time after its 5,000 miles' flight.

New Swedish Light Aeroplane

AN aeroplane of Swedish design and construction, introduced by the Svenska A/B, has attracted considerable attention to flying circles at Stockholm. It is slightly larger than the Moth type, and mainly intended as a practice machine. The 'plane, which is a convertible land or seaplane, according to the designers, is the result of several years' experience. The machine has a wing span of 10·4 m., carries a useful load of 470 kilos. and weighs 1,245 kilos. with full load. It is equipped with a Siddeley-Lynx motor of 200 h.p., and has a speed of 175 km. as a land machine and 170 km. when fitted as a seaplane. The change from wheels to floats takes only a few minutes. When tested, the 'plane proved to possess good flying qualities, and is well adapted for all kinds of aerobatics.

The AIRCRAFT ENGINEER

FLIGHT ENGINEERING SECTION

Edited by C. M. POULSEN

May 30, 1929

CONTENTS

EDITORIAL VIEWS.

While several standardised methods of performance estimation are in regular use, each having its advantages and disadvantages, and giving more or less accurate results according to the refinements retained in the particular method used, the prediction of *run to take-off* appears to have received much less attention, due no doubt partly to the difficulties involved. In ordinary performance calculations, although a good deal still depends upon the pilot, the actual handling of a machine plays a much smaller part than is the case when an attempt is made to estimate the length of run required to "unstick."

Mr. G. B. Fenton, of the technical staff of the Blackburn Aeroplane Company, has made an exhaustive study of the subject of taking off, and in an article contributed to THE AIRCRAFT ENGINEER this month he gives a very thorough explanation of a method of calculation which he has employed with good results.

Any method of calculation of run required to take off making use of the characteristics of the aircraft must be based upon reasonable assumptions as to the attitudes given by the pilot to the machine during the run, and in his method Mr. Fenton makes two main assumptions: During the run from no forward speed to minimum flying speed the aircraft is assumed to start from rest with its datum line horizontal, and to maintain this attitude until minimum flying speed is reached. This assumption neglects the time taken at the start to "get the tail up." As the run of most machines from rest until the tail is up is usually a few feet only, it is not considered that any important error is introduced by neglecting to take this into account.

The second assumption made by Mr. Fenton is that when the machine has reached flying speed, it takes the pilot one second to drop the tail. During this time it is also assumed that the machine is moving forward at a steady, *i.e.*, unaccelerated, speed equal to the minimum flying speed. It appears likely that, although the errors introduced by these assumptions are probably small, they do account for the variations in take-off run under identical conditions referred to by Mr. Fenton, but nevertheless the method should give as good accuracy as can reasonably be expected.

ESTIMATION OF THE LENGTH OF RUN REQUIRED TO TAKE OFF.

By G. B. FENTON, B.Sc. (Eng.), Lond., A.F.R.Ae.S.

The length of run required by an aeroplane to take off is a quantity that does not lend itself to simple and accurate estimation, since it depends to a large extent on factors uninfluenced by the aerodynamic characteristics of the aircraft. The most important of these factors is the way in which the aircraft is handled during the run, and as this lies entirely in the hands of the pilot, it will be seen readily that hard and fast rules cannot be used with any certainty. A study of any report of deck trials will show that under *identical conditions, variations in run of 20 per cent. can* be obtained, due simply to differences in piloting. Any method of calculation, therefore, which aims to predict from the aerodynamic data of the aircraft a figure for the length of run to get off, must have as its basis, reasonable assumptions for the attitudes given to the machine by the pilot during the run and subsequent take off. It is necessary therefore, to consider the manœuvres usually carried out from the time when the aircraft is stationary on the ground until it leaves the ground.

As soon as the engine is opened "All out" the machine *will commence to move forward with its skid on the ground.* Almost immediately, the pilot will operate the elevators to raise the tail, until the aircraft is running along with its datum line practically horizontal, *i.e.*, in approximately the attitude of minimum drag. This attitude is maintained until a speed is attained equal to, or greater than the minimum flying speed of the machine. The stick is then pulled back till the skid is almost on the ground, and the resulting increase of lift being sufficient to overcome the weight, the aircraft will rise into the air. Variations in the speeds at which the tail is dropped give rise to the *discrepancies in run observed in practice.*

The assumptions used in the following method of estimation aim to reproduce the manœuvres embodied in the method of take-off outlined above.

The take-off run is divided into two distinct parts:—

(A) Run during acceleration from no forward speed to minimum flying speed.

The aircraft is assumed to start from rest with its datum line horizontal, and to maintain this attitude until the minimum flying speed is reached. This agrees with the practical procedure, except that the time occupied in raising *the tail at the beginning of the run is neglected.* This neglect is quite justified, as the tail is usually up before a machine has moved forward more than two or three feet.

In fact, the tails of most aircraft can be raised by the action of static slipstream alone.

(B) Run while dropping tail.

When minimum flying speed is reached it is assumed that one second is taken to drop the tail till the wings are at the maximum angle of attack. During this second, the aircraft is supposed to be moving forward with a uniform speed equal to the minimum flying speed, *i.e.*, there is no acceleration. The choice of one second for the time to drop the tail has been made after comparing predicted results with values obtained from deck landing trials, and is considered to be quite a reasonable assumption. Also the assumption of no acceleration during this time leads to only a very small error, and is justified by the simplification obtained by its use.

Using the above assumptions and the fundamental aerodynamic data of the aircraft, the following method will be found to be very straightforward, though fairly laborious, and will yield results of real value, especially in the case of deck launching machines.

The first part of the calculation consists of finding the value of the total accelerating force at every point in the run. During the run the datum line of the aircraft is assumed to be horizontal.

$\therefore$ at any instant :—

Accelerating force $=$ thrust $\times \cos \theta -$ total drag,

where θ is the angle between the thrust line and the datum line of the machine.

θ is usually small, and it is sufficiently accurate to take $\cos \theta = 1$.

$\therefore$ Accelerating force $=$ thrust $-$ total drag.

(1) *To Find the Thrust* :—If the actual airscrew characteristics, torque coefficient K_Q, thrust-co-efficient K_T, and efficiency η are available from test or design, the thrust at all forward speeds can be found accurately with the aid of the engine power curve, but if the aircraft is still in the design stage and these characteristics are unknown, a more general method will have to be used.

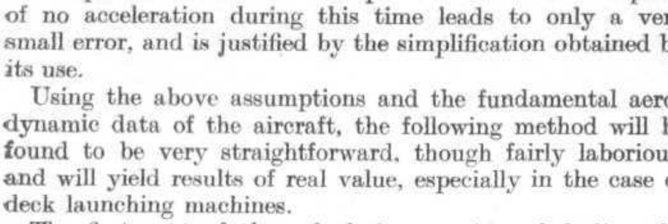

FIG. 1.

Assuming that the maximum power and revolutions of the engine, and a reasonably correct value of the top speed of the aircraft are known, it is an easy matter to obtain an approximate value for the airscrew diameter. The V/nD at top speed can then be found, and from this a good idea of the airscrew efficiency is obtained, followed by the calculation of the thrust at top speed. Then, if $T_L =$ thrust at top speed, and $V_L =$ top speed, the following empirical factors may be used to find the thrust T at any speed V.

V/V_L	1·00	0·80	0·60	0·40	0·20	0·00
T/T_L	1·000	1·124	1·250	1·370	1·460	1·50

A curve of thrust T against forward speed V is thus obtained.

From the thrust curve it is possible to obtain a curve of slipstream velocity using the formula

$T = 0{\cdot}00331\, D^2\, V^2\, a\,(1 + a)$ to find a.

where a = inflow velocity ratio.

T = thrust in lbs.

D = airscrew diameter in feet.

V = forward speed in ft./sec.

The final slipstream velocity $(V + v)$ is then given by $(V + v) = V\,(1 + 2a)$ ft./sec.

This formula assumes that the effective airscrew disc area is an annulus with external diameter D, and internal diameter 1/3D, and the diameter of the final slipstream can be shown to be $D_1 = D\sqrt{\dfrac{1 + 1{\cdot}11a}{1 + 2a}}$ ft., on the assumption that the external diameter contracts from D to D_1, while the diameter of the centre core remains equal to D 3.

Curves of slipstream speed, and slipstream diameter can therefore be plotted on a base of forward speed.

(2) *Total Drag of the Machine*.—The total drag of the aircraft during the run can be divided into six parts :—

(*a*) Wing drag in slipstream.
(*b*) Wing drag outside slipstream.
(*c*) Backward component of lift in slipstream.
(*d*) Parasite drag in slipstream.
(*e*) Parasite drag outside slipstream.
(*f*) Drag due to wheel friction.

It will first be necessary to define by symbols the attitude of the machine during the run, and to collect the following data from a 3-view G.A. :—

A = Total wing area in sq. ft.
A_1 = Wing area in slipstream.
A_2 = Wing area outside slipstream.

A_1 depends on the slipstream diameter, D_1, found as explained above, and hence varies with the forward speed. It will be sufficiently accurate, however, to take a mean value for the slipstream diameter, and a constant value for A_1 found by using this mean.

α^0 = main plane incidence, *i.e.*, angle of wings to datum line of machine.

α^0_0 = angle of main planes to thrust line.

The aircraft is running with its datum line horizontal. Therefore the angle of attack of the wings (outside slipstream) is α^0, and the thrust line is inclined at an angle of $(\alpha - \alpha_0)^0$ to the horizontal.

The characteristic curves of K_L, K_D, and L/D plotted against angle of attack α for the aerofoil will be required, and these must be corrected for the appropriate wing arrangement in the usual manner.

Then the following quantities are calculated for several values of the speed, from no forward speed to 5 or 10 m.p.h. above the minimum flying speed.

(*a*) *Wing Drag in Slipstream*.—Treating the air velocities vectorially and referring to Fig. 1, it can be shown that

α_1 = angle of attack of wings in slipstream.

$$= \alpha_0 + \frac{V}{V + v}\,(\alpha - \alpha_0).$$

Then at any forward speed :—

Lift in slipstream $= K_{L_1} \rho A_1 (V + v)^2$.

Wing drag in slipstream $= D_{W_1} = \dfrac{\text{lift in slipstream}}{(L/D)_1}$

where V = forward speed in ft./sec.
$V + v$ = slipstream speed in ft./sec. found previously.
A_1 = wing area in slipstream.
K_{L1} = lift coefficient appropriate to angle of attack $\alpha^0{}_1$.
$(L/_D)_1$ = Lift-drag ratio appropriate to angle of attack $\alpha^0{}_1$.
$\rho = 0{\cdot}00237$ at S.L.

K_L and $(L/_D)$, are taken from the wing characteristic curves.

(*b*) *Wing Drag Outside Slipstream* :—Lift outside slipstream is given by $K_L \rho A_2 V^2$, and wing drag outside slipstream $= D_{W_2} =$ lift outside slipstream $\times$ (L/D) where K_L and L/D are appropriate to the angle of attack α°.

(*c*) *Backward Component of Lift in Slipstream* :—A study of Fig. 1 will show that the lift in the slipstream is inclined backward at an angle of $(\alpha - \alpha_1)^\circ$ to the vertical. This causes a drag component D_{W_3}, which is equal to

Lift in slipstream $\times \sin (\alpha - \alpha_1)^\circ$.

(*d*) *Parasite Drag in Slipstream* :—The parasite drag at 100 ft./sec. is found by the usual methods (model test or detail estimation), and the proportions inside and outside the slipstream obtained.

Then parasite drag in slipstream $= D_{B_1} = d_1 \times \dfrac{(V + v)^2}{100^2}$

where d_1 = parasite drag in slipstream at 100 ft./sec.
$V + v$ = slipstream velocity in ft./sec.

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(*e*) *Parasite Drag Outside Slipstream* :—Similarly, parasite drag outside slipstream $= D_{B_2} = d_2 \times \frac{V^2}{100^2}$

where d_2 = parasite drag outside slipstream at 100 ft./sec.
V = forward speed in ft./sec.

(*f*) *Drag due to Wheel Friction* :—In the case of a normal aerodrome, a coefficient of friction μ of 0·05 should be used, but for aircraft operating from a deck, $\mu = 0 \cdot 04$ may be taken.

Then if W = gross weight of machine,

Drag due to friction $= D_F = (W - \text{total lift}) \times \mu$.

The total lift is given by (lift in slipstream + lift outside slipstream) found previously, the vertical component of the thrust being neglected, as it is usually very small when the aircraft is in the assumed attitude.

We are now in a position to find the total drag by adding the above items, *i.e.*,

Total drag $D = D_{W_1} + D_{W_2} + D_{W_3} + D_{B_1} + D_{B_2} + D_F$.

The total drag values are now subtracted from the thrusts at appropriate speeds, giving values of accelerating force F and a curve of accelerating force F against air speed V plotted.

This completes the first part of the investigation, dealing with the aircraft in the "tail up" attitude.

The next step is to determine the minimum speed at which the aircraft will take off with the tail down and the wings at their maximum angle of attack.

The angle of attack with the skid on the ground is found from the G.A. of the machine, and the total lift calculated at this attitude for a few speeds near the expected take-off speed.

The total lift consists of—

(1) Lift in slipstream.
(2) Lift outside slipstream.
(3) Vertical component of thrust.

(1) and (2) need not be explained, as the method employed is identical with that given previously under headings (*a*) and (*b*), the only variation being in the angle of attack.

As the angle of the thrust line is much greater than in the "tail up" attitude, the vertical thrust component is now too large to neglect, and we obtain for item (3) :—

Lift due to vertical thrust component $=$ thrust $\times \sin(\alpha_3 - \alpha_0)^\circ$ where α_3 is the angle of attack of the wings in the "tail down" attitude.

On the assumption of no acceleration, the drag is unnecessary for this stage, and need not be calculated.

The total lift L is obtained by adding items (1), (2) and (3), and is then plotted against air speed V.

Then the speed at which the total lift is equal to the weight W is the minimum take-off speed V_S.

We can now proceed to evaluate the run required against any head wind or deck speed.

As previously explained, the run is divided into two distinct parts :—

(A) *Run with Tail Up* :—Let the constant wind or deck speed $= V_o$ ft./sec.

Then, if at any instant the speed of the aircraft relative to still air is V ft./sec. its speed relative to the deck will be $(V - V_o)$ ft./sec.

Now, starting from rest relative to the deck or ground (actual air speed V_o), take constant increments of velocity, say 5 m.p.h. to slightly above the minimum take-off speed.

For each of these velocity increments there is a constant increment of momentum, given by

$$\text{Increment of momentum} = \frac{W}{g} \times \text{increment of velocity (velocity in ft./sec.)}.$$

Now from the curve of accelerating force find the mean value of F over each velocity increment, and hence the time t occupied in each velocity increase.

$$\text{since Time } t = \frac{\text{increment of momentum}}{\text{accelerating force.}}$$

Then the multiplication of t by the mean velocities (relative to the deck or ground) will give the run required for each velocity increment, and a progressive addition of these runs will enable a curve of run against true air speed to be plotted.

A tabular method should be employed for the above calculation, and a typical example, which should make the explanation much clearer, is given in Fig. 2.

The weight of the aircraft was 7,040 lbs., and the deck speed was 16 knots.

Velocity increments of 8 knots were taken, giving

$$\text{Increment of momentum} = \frac{7{,}040}{32 \cdot 2} \times (8 \times 1 \cdot 69) = 2{,}960 \text{ lbs./sec.}$$

The following columns are employed :—

(1) Velocity relative to still air $= V$.
(2) Velocity relative to deck $= (V - V_0) = (V - 16$ knots) in this case.
(3) Mean velocity V_M relative to still air.
(4) Mean velocity V_D relative to deck.
(5) Accelerating force F at each value of V_M.
(6) Time t secs. $= \frac{\text{increment of momentum.}}{\text{accelerating force.}}$
(7) Increment of run $= t \times$ mean velocity V_D.
(8) Total run by progressive addition.

Column (8) is plotted against column (1), and the value of the total run found when V is equal to the minimum take-off speed.

In the example the minimum take-off speed was 43·5 knots, giving a total run of 142 ft. against a head wind or deck speed of 16 knots.

FIG. 2.

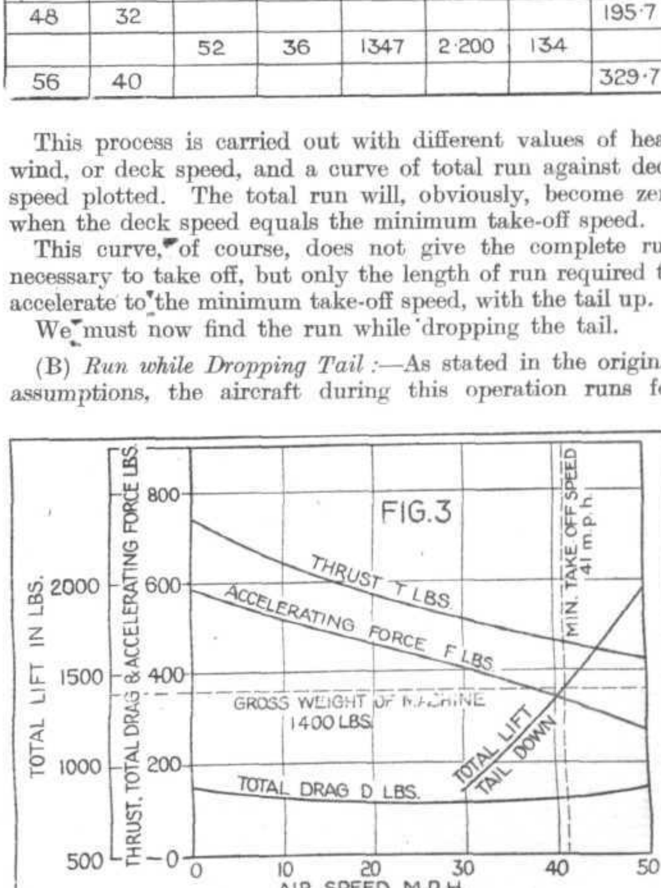
(1) VELOCITY RELATIVE TO STILL AIR V KNOTS	(2) VELOCITY RELATIVE TO DECK (V-16) KNOTS	(3) MEAN VELOCITY RELATIVE TO STILL AIR V_M KNOTS	(4) MEAN VELOCITY RELATIVE TO DECK V_D KNOTS	(5) MEAN ACCELERATING FORCE OVER EACH INCREMENT	(6) TIME t SECS. FOR EACH INCREMENT	(7) RUN FOR EACH VELOCITY INCREMENT FEET	(8) TOTAL RUN IN FEET
16	0						0
		20	4	1882	1·572	10·6	
24	8						10·6
		28	12	1808	1·640	33·3	
32	16						43·9
		36	20	1680	1·764	59·6	
40	24						103·5
		44	28	1521	1·945	92·2	
48	32						195·7
		52	36	1347	2·200	134	
56	40						329·7

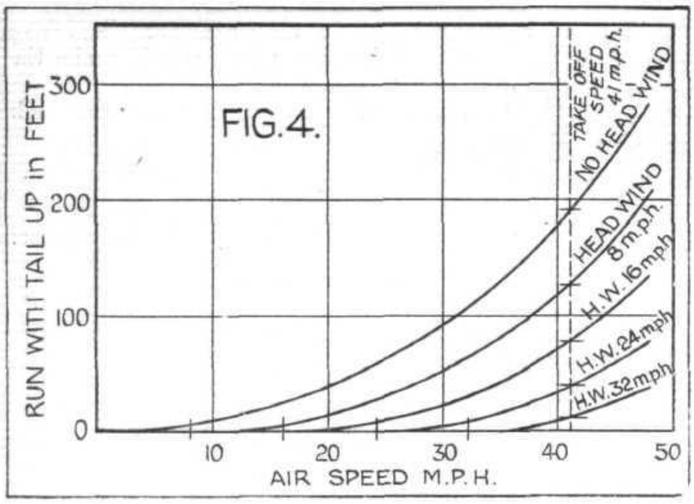
This process is carried out with different values of head wind, or deck speed, and a curve of total run against deck speed plotted. The total run will, obviously, become zero when the deck speed equals the minimum take-off speed.

This curve, of course, does not give the complete run necessary to take off, but only the length of run required to accelerate to the minimum take-off speed, with the tail up.

We must now find the run while dropping the tail.

(B) *Run while Dropping Tail* :—As stated in the original assumptions, the aircraft during this operation runs for

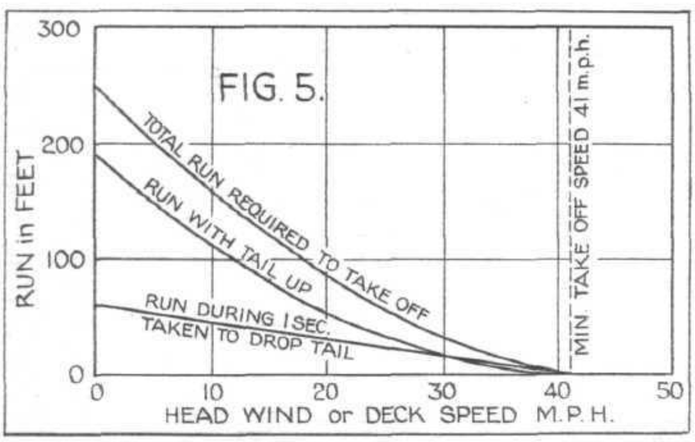




one second at the minimum take-off speed V_S (relative to still air), and is assumed to have no acceleration.

Its actual speed relative to the ground or deck will be $(V_S - V_O)$, and the run while dropping the tail will be $(V_S - V_O) \times 1$ ft., if V_S and V_O are in ft./sec. A curve of run while dropping tail against deck speed V_O can therefore be plotted, and, as before, the run will be zero when V_O = the minimum take-off speed V_S.

The calculation is then completed by adding the final curves of (A) and (B), and thus obtaining a curve of total run required to take off against various head winds or deck speeds.



The accompanying curves give typical results of the use of the method on a normal tractor biplane having a gross weight of 1,400 lbs.

Fig. 3 shows the thrust, total drag, and accelerating force plotted against air speed in miles per hour for the machine in the "tail up" attitude, and in the same figure is the total lift at various speeds with the "tail down," giving the true air speed for take off.

Fig. 4 gives the curves of section (A), *i.e.*, run with "tail up" plotted against true air speed for various values of head wind or deck speed.

Fig. 5 gives the final curves of run with "tail up" (taken from Fig. 3 for the true value of take-of speed), run while dropping tail (as outlined in section (B)), and the total run required to take off plotted against head wind or deck speed.

In conclusion, the method outlined above, though rather laborious, is very straightforward, and will yield quite good results. The work will be facilitated by the adoption of a standard system of tabulation.

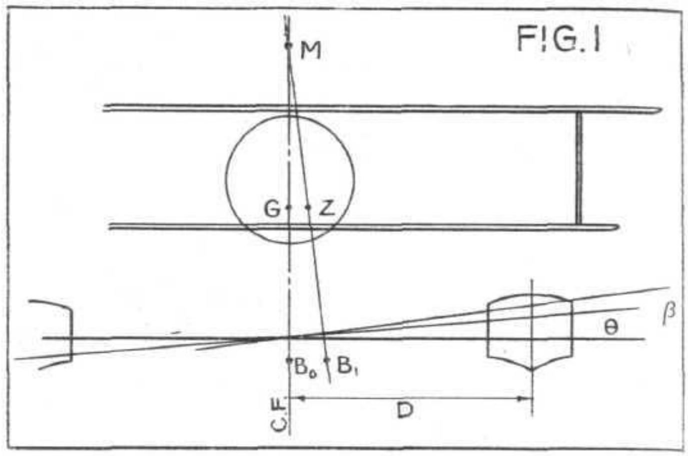
It can be adapted to different atmospheric conditions, and the principle can also be used to find the time and run to get off of flying-boats and seaplanes. In this case, of course, the given assumptions do not apply, the attitudes during the run being governed to a large extent by the hull or float design. These attitudes, together with the water resistance, must be taken from tank tests of the hull or float, and the method modified to suit the case.

STABILITY OF SEAPLANES AFLOAT.

By "C. W. P."

The following notes may be found of use to the aeronautical engineer when planning the disposition of floats in seaplanes or flying-boats.

An accurate estimate can be made by the following methods in order to find the righting couple that will be available to counteract any upsetting force likely to be met in service when the machine is at rest or travelling on the surface.



Case I. Fig. 1.

Twin float machines in which two equal floats are placed symmetrically about the centre line of the machine.

In this case the shift of moment equals.

$$\int_o^\theta 2\ (I\ \delta\ \theta)$$

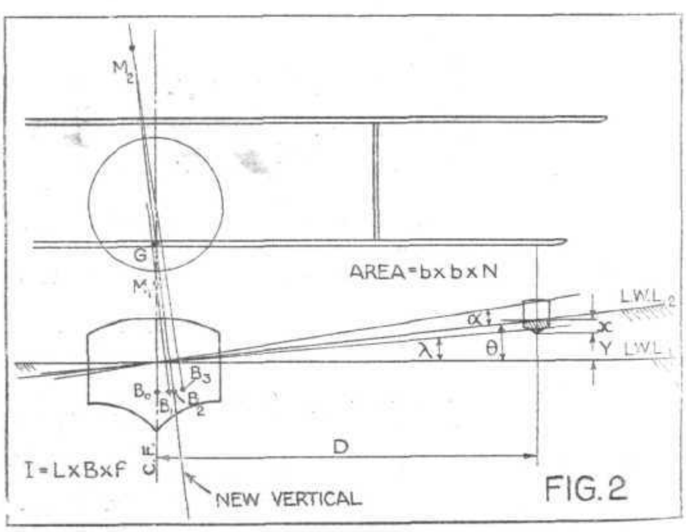
I = I about centre of flotation of each float +

Area of waterplane $\times\ D^2 = N.L \times B \times D^2$

since I, C.F. is negligible.

or $\quad BM = \dfrac{2\ N.L \times B \times D^2}{V}$ and the righting lever

$= GZ = GM \sin \theta.$



Case II. Fig. 2.

Flying boat.

$$B_o M = \frac{I}{V} = f\ \frac{L.\ B^3}{V}$$

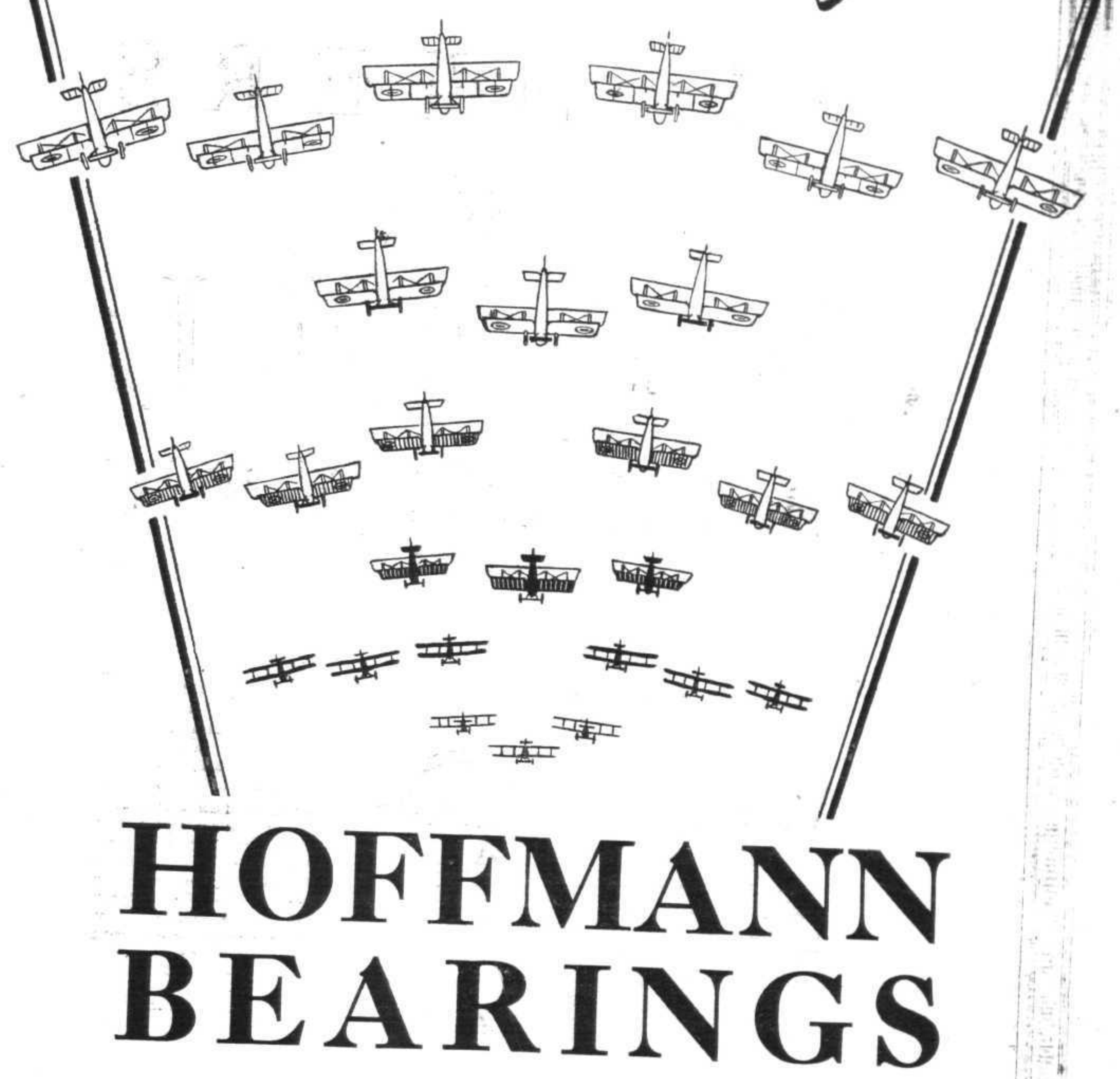
$G.Z_1 = -\ G M \sin \lambda$. Unstable, therefore wing tip floats must be fitted. It is now necessary to ascertain the size and disposition of the wing tip float.

Several trials should be made, using the following notation :—

V = total volume of water displaced.

I = moment of inertia of waterplane.
= length × breadth × function *f*.

Uniformity



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f = 0·049 for an approximate streamline area of average fineness. It can be increased to 0·058 for "full" types.

The actual I can, of course, be found by running it through Simpson's Rule, but it is quite unnecessary.

A = area of waterplane = length × breadth × function N.
N = 0·725 to 0·85 according to shape and "fullness" of area.
M is metacentre G M = metacentric height.
G = centre of gravity. G Z is the righting lever and V × GZ × wt. of unit of water, is the righting couple.

Angle β is that at which the stability fades.

Let D = distance of wing-tip float from centre line and x the depth it will be immersed, then by taking moments about centre line of machine,

$$(1)\ B_0 B_2 = O + \frac{(L \times b \times N \times x) \cdot D}{\text{total } V}$$

but $B_0 B_2 = B_0 G \sin\theta$, the angle through which the machine heels to come to a position of equilibrium, because for equilibrium G *must* be vertically above B_2, the new centre of buoyancy.

Also $Y = D \sin\lambda$
and $X = D \sin\theta - Y$.

Then by substitution in (1) $B_0 B_2$ becomes =

$$O + D\frac{(L \times b \times N\,(D \sin\theta - Y))}{V}$$

$= B_0 G \sin\theta$, which can be neglected unless λ is very large.

The system being now in equilibrium, we can proceed to find $B_2 M_2$ of the new system, wing-tip floats afloat.

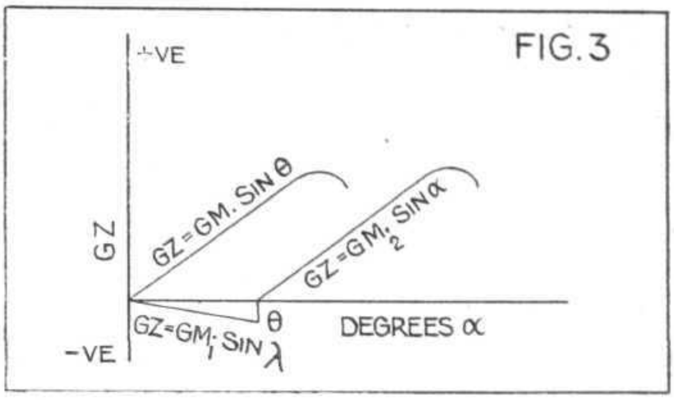
$$B_2 M_2 = \frac{I}{V} = \frac{(f.A.B^3) + D^2 \times (N.a.b)}{V}$$

$$G.M. = B_2 M_2 - B_2 G.$$

$$G Z_2 = G M_2 \sin\alpha - B_0 B_2.$$

The neglect of $B_0 B_2$ when working out the new I will not affect the accuracy unless the angle λ is very great.

Also note that B_1 and B_2 are practically identical.



It will also be seen that it is not necessary to work out the volume of the hull very accurately; a rough estimate for the vertical position of B can be made, and V can be got from the weight of machine. In any case, G is always a long way from B, and a few inches one way or the other will make but slight difference to G Z.

Fig. 3 gives an idea of the curve of G Z, from which, of course, the angle of heel can be found for any given upsetting couple. It should be supplied with every seaplane sold.

With regard to longitudinal stability, with or without a tail float, the position of the C.B. is not so readily seen. Boujean curves would be necessary as the areas of waterplane vary rapidly with θ.

IN THE DRAWING OFFICE.

DETAIL STRESSING

By H. PARKINSON, A.R.Ae.S.I.

At the present time, riveting plays an important part in design, and strength calculations in this respect take up no little time, particularly when catering for spar end loads, struts and stays with riveted type ends, tension sockets in tubes, etc.

The charts are plotted for an hypothetical material having stress value of *fb*, *ft* and *fs* = 10 tons per sq. in.

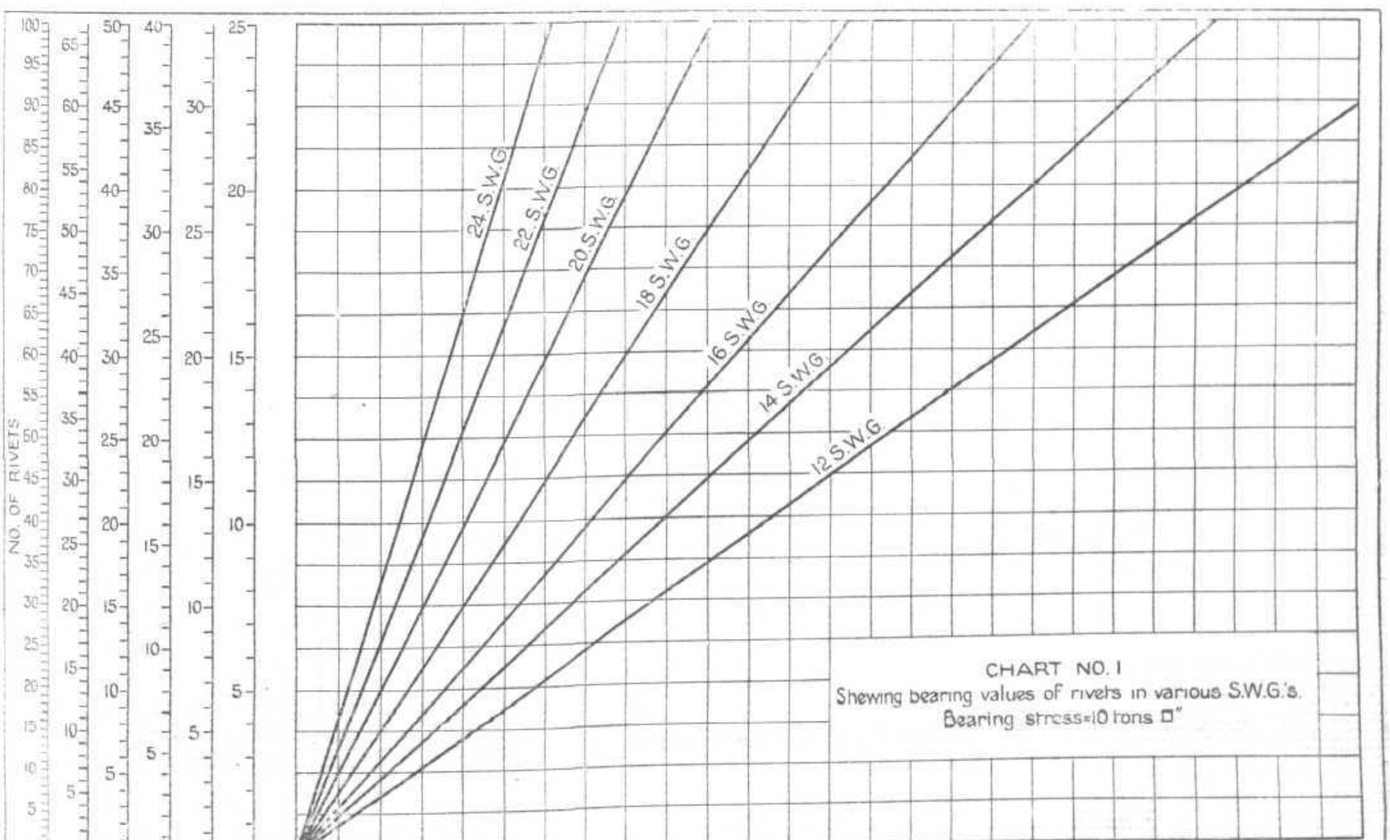
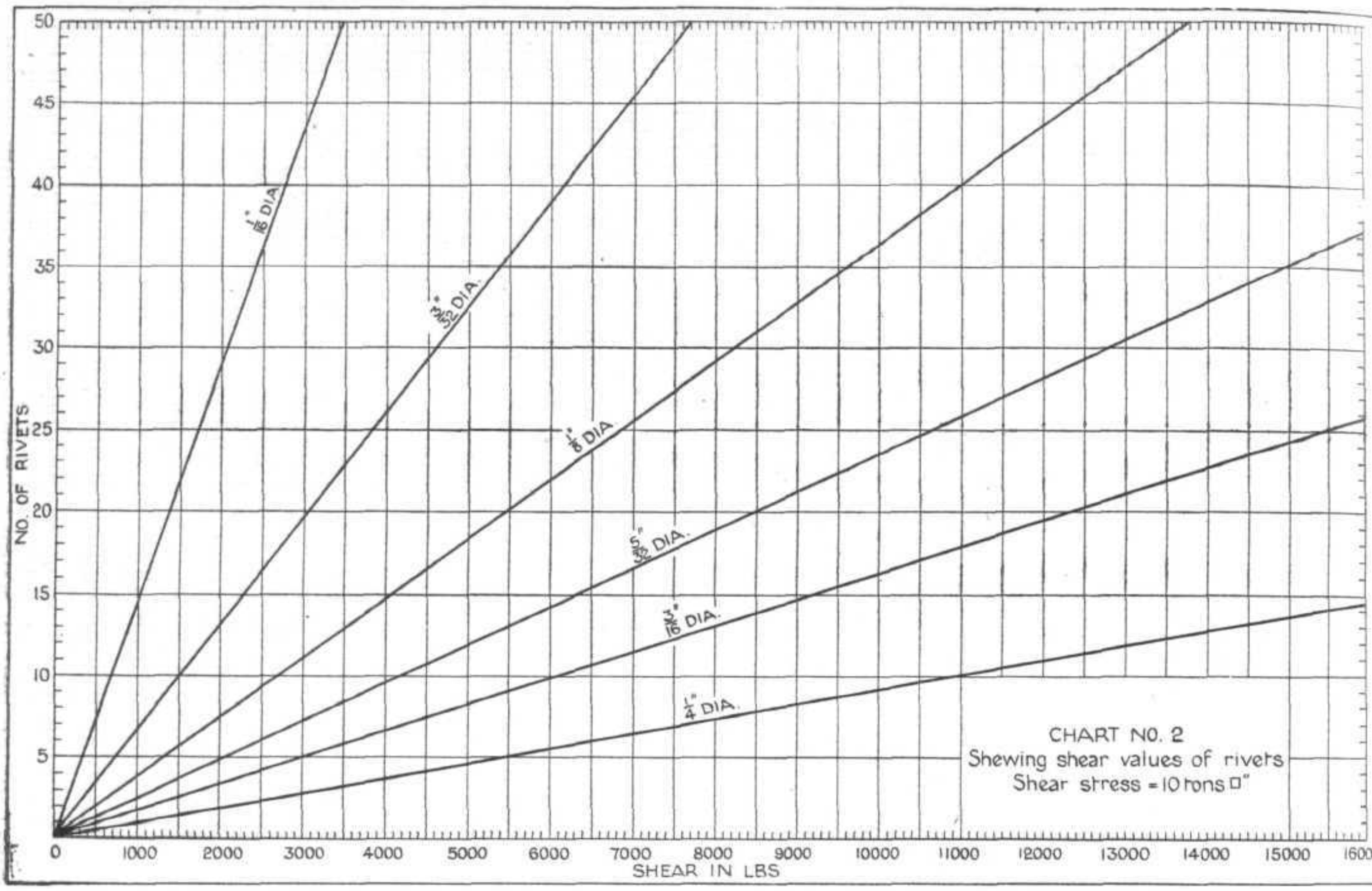


CHART NO. I
Shewing bearing values of rivets in various S.W.G.'s.
Bearing stress=10 tons □"



Use of Chart 1

How many rivets bearing in 20 S.W.G. are required to transmit 12,000 lbs. ($fb = 30$ tons per sq. in.)

Constant for chart use $= \frac{12,000}{.\,3} = 4,000$ lbs.

4,000 lbs. at the intersection of 20 S.W.G., on Chart 1, offers the following rivets. 20—$\frac{1}{4}$ dia., 27—$\frac{3}{16}$ dia., 32—$\frac{5}{32}$ dia., 40—$\frac{1}{8}$ dia., 53—$\frac{3}{32}$ dia., 79—$\frac{1}{16}$ dia.

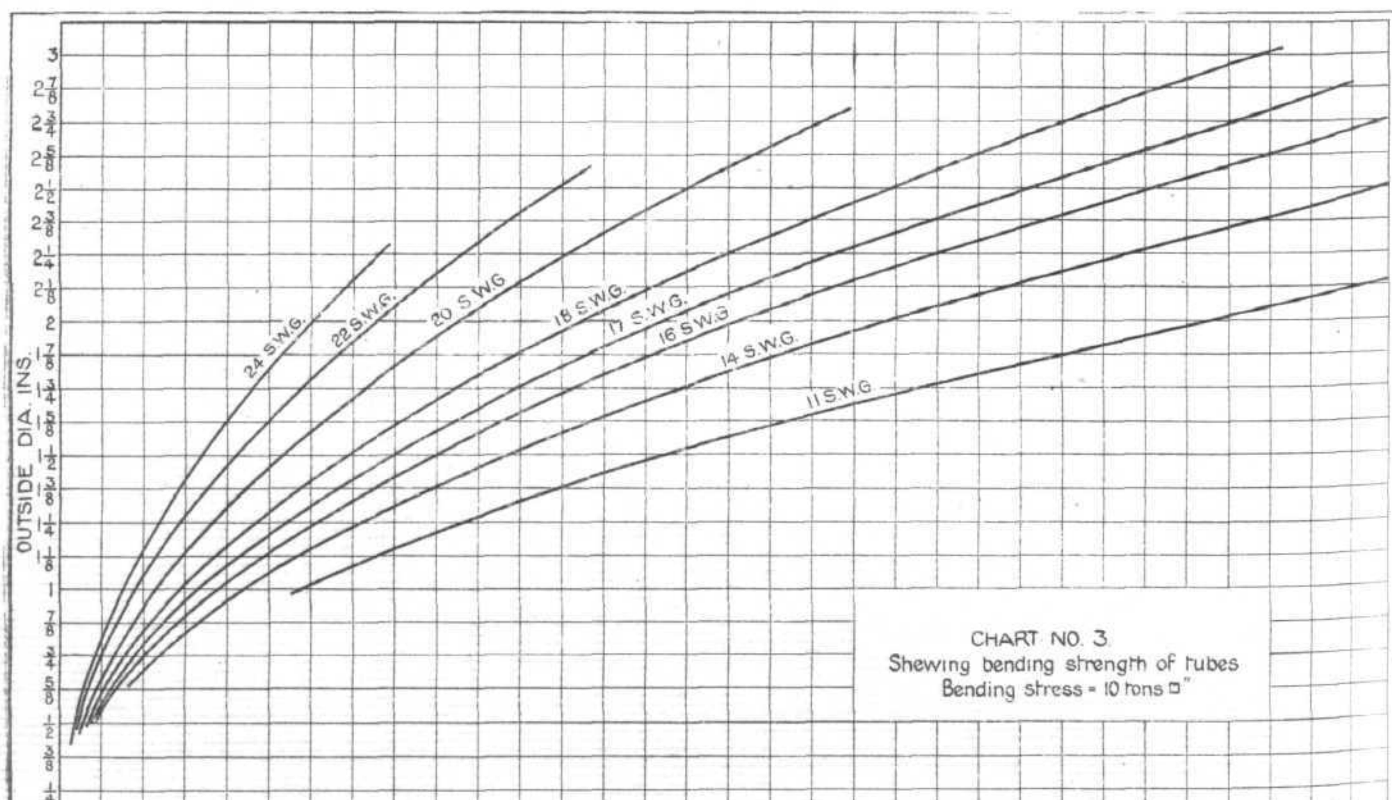
Use of Chart 2

How many rivets in single shear are required to transmit 10,000 lbs. ($fs = 20$ tons per sq. in.)

Constant $= \frac{10,000}{2} = 5,000$ lbs.

5,000 lbs. on chart 2 offers: 5—$\frac{1}{4}$ dia., 8—$\frac{3}{16}$ dia., 12—$\frac{5}{32}$ dia., 18—$\frac{1}{8}$ dia., 33—$\frac{3}{32}$ dia.

It will be seen that by inspection of charts one may readily



fix the most convenient size and number of rivets with respect to bearing and shear.

Use of Chart 3

Required: Tube to transmit a B.M. of 9,000 lbs. ins. (bending stress = 30 tons per sq. in.)

$$\text{Constant} = \frac{9{,}000}{3} = 3{,}000$$

3,000 lbs. on chart 3 shows we may use either of the following: $1\frac{3}{8} \times 11$ S.W.G., $1\frac{3}{8} \times 14$ S.W.G., $1\frac{3}{4} \times 16$ S.W.G., $1\frac{7}{8} \times 17$ S.W.G., 2 in. $\times$ 18 S.W.G., $2\frac{1}{4} \times 20$ S.W.G. or $2\frac{1}{2} \times 22$ S.W.G.

Chart No. 3 may be conveniently plotted for any family of standard sections which are likely to be manufactured in a variety of metals and S.W.G's.

Should it be found necessary to design for loads greater than the scope of charts 1 and 2, it will be convenient, as the user will readily see, to halve the load and double the required number of rivets.

TECHNICAL LITERATURE

SUMMARIES OF AERONAUTICAL RESEARCH COMMITTEE REPORTS

These Reports are published by His Majesty's Stationery Office, London, and may be purchased directly from H.M. Stationery Office at the following addresses: Adastral House, Kingsway, W.C. 2; 28, Abingdon Street, London, S.W.1; York Street, Manchester; 1, St. Andrew's Crescent, Cardiff; or 120, George Street, Edinburgh; or through any bookseller.

EXPERIMENTS ON A MODEL OF THE AIRSHIP R.101. By R. Jones, M.A., D.Sc.; and A. H. Bell.) R. & M. No. 1168 (Ae. 332). (27 pages and 7 figures.) September, 1926. Price 1*s*. 3*d*. net.

Experiments are described which were undertaken to determine the aerodynamic characteristics of alternative forms of hull and fins suggested for the Government airship R.101. In the first place, experiments were made on a model resembling the shape (U. 721)* whose head resistance was the lowest ever determined at the N.P.L., and on a second model which was the same as the former from the nose to the maximum diameter, but whose tail was an oval in cross-section such that the vertical dimension was greater than the horizontal dimension. Such a form would not necessitate so great an area of vertical fin for lateral stability as the normal form. The drag of the model with the oval tail was found to be slightly higher than that of the other, which itself was slightly higher than that of U.721. It was decided, therefore, to abandon the shape with the modified tail in favour of the more normal design. Experiments were then carried out on various types of fin for the selected shape, and a highly satisfactory type was ultimately developed.

* R. & M. 607. Experiments in a wind channel on elongated bodies of approximately streamline form. Part III. Effect of form on resistance.—Pannell and Jones.

INSTRUMENTAL RECORDS OF THE LATERAL MOTIONS OF A STALLED BRISTOL FIGHTER AEROPLANE. By Prof. B. Melvill Jones, A.F.C., M.A., F.R.Ae.S., and Flt.-Lieut. C. E. Maitland, D.F.C., R.A.F. R. & M. No. 1181 (Ae. 345). (11 pages and 42 diagrams.) September, 1928. Price 1*s*. net.

This report represents a practical contribution to knowledge on the important question of the control of aeroplanes at high angles of incidence. The object of these experiments was to obtain a series of instrumental records which would display the behaviour of an aeroplane under the action of its control when flying at high incidences. A standard Bristol Fighter was chosen as the aeroplane because it is a type for which many accidents have been attributed to stalling. Model experiments at high incidences relating to the action of the controls and the effects of rotation, and free flight experiments giving lift and drag up to about 23° incidence, have previously been made on this aeroplane; these provide data which can be used in the analysis and explanation of the results to be described.

The Instruments.—These were designed and made at the Royal Aircraft Establishment and lent to the Cambridge University Air Squadron for these experiments. They consist of three recording gyroscopic rate of turn indicators, which give continuous photographic records of the angular velocities of the aeroplane about three mutually perpendicular axes. Three other instruments give continuous records of the movements of the controls—elevators, ailerons, and rudder. All six records are synchronised from a single clock.*

Discussion of Results.—In all, something over 100 experiments were recorded, but, owing to the difficulty of ensuring the correct initial conditions, some of these were repeats, and in some the initial conditions were too complicated for the results to be of much value. The 42 records chosen for reproduction are representative of the whole, and form a fairly complete series, in which the progressive deterioration of the control, from normal flight to severely stalled flight, can be traced.

The complete series of records fully explain the great difficulty of controlling a stalled aeroplane.

The view which has been put forward by the Aeronautical Research Committee, that it is important to provide adequate rudder power to alleviate the dangers of accidental stalling, but that no rudder, however powerful, can alone provide satisfactory control, is confirmed. The view, derived mainly from the study of wind-tunnel data, that the rudder of the Bristol Fighter was inadequate for stalled flight, is also confirmed.

The report is purely descriptive, being a record of the results obtained, with a brief discussion which does no more than point out their principal features. The correlation of these experiments, with the results of experiments on models involves rather computation, and is not yet completed.

* R. & M. 942. The R.A.E. Control Movement Recorder Mark III.—B. A. Jones and H. L. Stevens.

FULL SCALE EXPERIMENTS WITH A BRISTOL FIGHTER FITTED WITH SLOTS AND FLAPS AND SLOT AND AILERON CONTROL. By K. V. Wright, B.A. Presented by the Director of Scientific Research, Air Ministry. R. & M. No. 1188 (Ae. 350). (6 pages and 6 diagrams.) June, 1928. Price 9*d*. net.

The present report describes an investigation of the lift and drag and of the control at low speeds, of a Bristol Fighter fitted with slots and flaps and slot and aileron control, described in R. & M. 1088.*

The lift and drag have been measured with the slots and flaps in three positions, the latter being set at 0°, 9·9° and 15°. In the first two positions the mean position of the ailerons was the same as that of the flaps, whereas with the flaps at 15° the ailerons remained at 10°. Experiments were made to determine the relative effectiveness of the slot and aileron control in stalled flight with the flaps and ailerons set for maximum and minimum camber.

The maximum lift coefficients with the flaps at 0° (slot closed) and at 9·9° and 15° (slots open) were 0·53, 0·77 and 0·83 respectively. The drag with the flaps at 0°, in which position the wing was of normal R.A.F.15 section, was found to be high. The slot and aileron control was found to be equally effective at all flap settings.

Quantitative observations of the effectiveness of the controls will be made in accordance with a programme drawn up by the Stability and Control Panel.

* R. & M. 1088. Preliminary report on the fitting of slots and flaps and slot and aileron control to a Bristol Fighter, by H. L. Stevens, B.A.

WIND TUNNEL EXPERIMENTS ON THE DESIGN OF AN AUTOMATIC SLOT FOR R.A.F.31 SECTION.—By F. B. Bradfield, Math. & Nat. Sci. Triposes, and F. W. G. Greener, B.Sc. Presented by the Director of Scientific Research, Air Ministry. R. & M. No. 1190 (Ae. 352). (11 pages and 5 diagrams.) August, 1928. Price 9*d*. net.

These tests form part of a wind tunnel investigation of autoslots on wings of various sections.

An aerofoil of R.A.F. 31 section has been tested with an auxiliary aerofoil whose chord is 15 per cent. of the main chord. A range of linkages was tested. The free position of the auxiliary and the lift of the wing with the slot have been measured.

The auxiliary cannot be brought far enough forward to produce the best results, unless extremely long links are used, and some other form of opening mechanism is desirable. The maximum lift coefficient with the links tested is 0·8; the effect on lift of small slot openings may be large, and may be objectionable if the aeroplane is rolled so that one slot opens and not the other.

It is proposed to carry out similar tests on a wing of R.A.F. 34 section.

WIND-TUNNEL TESTS FOR DESIGN OF AN AUTOMATIC SLOT FOR AVRO 504 N. By E. T. Jones, M.Eng., and K. W. Clark, B.Sc., D.I.C. Presented by the Director of Scientific Research, Air Ministry. R. & M. No. 1192 (Ae. 354). (11 pages and 5 diagrams.) May, 1928. Price 9*d*. net.

Wind-tunnel tests were required to provide data for the design of an automatic slot for the Avro 504 N aeroplane.

The maximum lift of the slotted wing has been measured in a wind speed of 60 ft./sec. on an aerofoil of 6·43 in. chord and 36 in. span, with a fixed auxiliary aerofoil of equal span over a range of auxiliary aerofoil positions, and at 40, 50 and 60 ft./sec. with the auxiliary aerofoil set in one position. A link mechanism was designed to allow the auxiliary aerofoil to reach the optimum position, and measurements of slot opening against wing incidence were made on a 2-ft. chord aerofoil.

The maximum lift coefficient of the slotted wing with the auxiliary aerofoil in the optimum position is 0·80 at 22° incidence, while that of the unslotted wing is 0·55 at 15°·0 incidence, measured in a wind speed of 60 ft./sec. The lengths of the links necessary to allow the auxiliary aerofoil to reach the optimum position are 3·5 in. and 2·75 in. for front and rear links, respectively, for a wing of 2 ft. chord. The auxiliary aerofoil begins to move forward at 7° incidence, and the slot is fully open at 20° incidence.

THE LONGITUDINAL CONTROL OF AN AEROPLANE BEYOND THE STALL. By H. M. Garner, M.A., and K. V. Wright, B.A. Presented by the Director of Scientific Research, Air Ministry. R. & M. No. 1193 (Ae. 355). (6 pages.) May, 1928. Price 4*d*. net.

It is a matter of experience that the control of an aeroplane beyond the stall is much more difficult than at normal incidences. Until the advent of slot control it was impossible to say how much the failure of the control was lateral and how much longitudinal. A good deal of experience has now been obtained in flying aeroplanes with slot control at large angles of incidence

and although the lateral control at the stall is quite good, it is found that for each aeroplane there is a limiting angle of incidence fairly sharply defined, beyond which the aeroplane cannot be flown steadily. This appears to be independent of the tail setting. This limitation of the angle of incidence is due to the fact that the pilot is unable to maintain the longitudinal control.

The stability of an aeroplane in which the elevators are controlled in different ways has been investigated for different angles of incidence covering the stalling region. It is found that a longitudinal control depending upon the rate of pitch of the aeroplane is very satisfactory beyond the stall, the damping of the quick period being increased considerably. The damping of the long period is reduced, but it should still be adequate. If necessary, it can be increased by introducing an additional control depending upon the angle of pitch.

It is suggested that a form of automatic control which moves the elevators through an angle proportional to the rate of pitch should be developed for use on a Bristol Fighter or Ape aeroplane. It might also be desirable to combine this control with a control depending upon the angle of pitch.

WIND-TUNNEL TESTS WITH HIGH TIP-SPEED AIRSCREWS. THE CHARACTERISTICS OF A CONVENTIONAL AIRSCREW SECTION, 0·082 c. THICK, AND OF R.A.F. 27 AND R.A.F. 28. By G. P. Douglas, D.Sc., and W. G. A. Perring, R.N.C. Presented by the Director of Scientific Research, Air Ministry. R. & M. No. 1198 (Ae. 359). (4 pages and 5 diagrams.) May, 1928. Price 1*s*. net.

The present experiments continue the investigation into the effect of tip speed on airscrew performance described in R. & M. Nos. 884,* 1086,† 1091,‡ and 1124.§

The thrust and torque grading of model airscrews having the following blade sections :—

(1) A thin conventional airscrew section (0·082 c. thickness) ;
(2) R.A.F. 27 (symmetrical aerofoil section) ;
(3) R.A.F. 28

have been measured under the same conditions as the R.A.F. 31A bi-convex and conventional airscrews described in previous reports. Each airscrew was tested at tip speeds up to 1·3 times the velocity of sound, and the results have been analysed to show the variation of lift and drag coefficient of the blade sections with speed. A comparison of the characteristics of the sections tested with the results of the conventional airscrew section (R. & M. 322, No. 3), contained in R. & M. 1124, has been made.

At speeds between 0·7 and 0·9 of the velocity of sound, all the present sections appear, for a considerable range of lift coefficient, definitely better than the conventional airscrew section R. & M. 322, No. 3, and all the sections previously tested. The results for speeds of 0·8 and 0·9 of the velocity of sound at the inner radii show the symmetrical section R.A.F. 27 to be superior to the other sections tested ; but at the tip radius the thin conventional airscrew section appears to give as good results. A comparison of the thin conventional section, with the 0·10 c. conventional section of R. & M. 1124, confirms a previous conclusion, viz., that sections should be as thin as possible to minimise loss at high speeds. A comparison of sections of the same thickness shows that low-cambered Joukowski sections are superior to conventional airscrew sections, a 0·10 c. Joukowski section giving almost as good results as the 0·08 c. conventional section.

The increase of slope of the lift curve with speed in the case of the Joukowski sections R.A.F. 27 and R.A.F. 28 confirms the theory of report B.A. 686,‖ but the rise in lift of the conventional section is much less marked.

It appears desirable to extend these tests to cover a wider range of Reynold's number, and also to test Joukowski aerofoils of still thinner section.

Full-scale tests of a conventional section are in progress.

* R. & M. 884. The effects of tip speed on airscrew performance.—By R. McKinnon Wood and G. P. Douglas, R.A.E.

† R. & M. 1086. Wind-tunnel tests with high tip-speed airscrews. The characteristics of the aerofoil section R.A.F. 31A at high speeds.—Douglas & Perring, R.A.E.

‡ R. & M. 1091. Wind-tunnel tests with high tip-speed airscrews. The characteristics of a bi-convex aerofoil at high speeds.—Douglas & Perring, R.A.E.

§ R. & M. 1124. Wind-tunnel tests with high tip-speed airscrews. The characteristics of a conventional airscrew section aerofoil R. & M. 322, No. 3, at high speeds.—G. P. Douglas, D.Sc., and W. G. A. Perring, R.N.C.

‖ R. & M. 1135. The effect of compressibility on the lift of an aerofoil. —H. Glauert.—R.A.E. Report B.A. 686.

DETERMINATION OF THE TWIST OF A WING OF AN AEROPLANE IN FLIGHT. By W. G. Jennings, B.Sc. Presented by the Director of Scientific Research, Air Ministry. R. & M. No. 1202 (Ae. 363). (5 pages and 1 diagram.) September, 1928. Price 6*d*. net.

When comparisons have been made between model and full-scale tests of the aerodynamic chracteristics of aeroplanes, it has been noticed, in a few cases, that the full-scale incidence exceeds that of a model by ½—1° at the same value of the lift coefficient. The suggestion has been made that this discrepancy may, in part, be due to the method of determining the wing incidence in full-scale work. The usual method of doing this is to correlate the mean wing incidence on the ground with the reading of an inclinometer in the cockpit and the assumption is made that, in flight, the calibration of the inclinometer thus obtained still holds. It is possible, however, that the change in the forces in the structure when the aircraft is on the ground and when airborne may produce a change in the angle of the wing chord relative to the fuselage.

The present report describes static and flight tests made on a Bristol Fighter aeroplane in order to measure the twist of the wings that actually occurs. When allowance was made for the change n the centre of pressure, good agreement was obtained between the results of these two types of tests. But they both showed that the wing twist caused by air loads occurs in a direction opposite to that which would be required to explain the discrepancy between the full-scale and model lift curves. With the aircraft rigged normally, the mean change of incidence was found to be less than 0·2°. By slackening the bracing wires considerably, it was found that this increase in incidence could be doubled.

FULL SCALE TESTS OF BRISTOL FIGHTER AEROPLANE WITH R.A.F. 30 WINGS, FITTED WITH "PILOT PLANES" AT THE WING TIPS. By W. G. Jennings, B.Sc. Presented by the Director of Scientific Research, Air Ministry. R. & M. No. 1205. (Ae. 366.) (4 pages and 2 diagrams.) August, 1928. Price 4*d*. net.

At the date of inception of this work (October, 1926), full-scale tests of slot and aileron control had been confined to aircraft with thin cambered wing sections, such as Avro 504K and R.A.F.15. It was considered desirable to attempt its application to a thick symmetrical wing ; but model tests indicated that it would cause excessive drag. An alternative, the uncontrolled slot, had presented itself and became practicable in the form of the pilot plane towards the end of 1926.

Tests were carried out on a Bristol Fighter aeroplane fitted with R.A.F.30 wings and with the pilot plane system of self-setting slots, at the wing tips. The effects of slotting both the upper and lower wing tips and of increasing the chord of the pilot plane were observed.

It would appear that the pilot plane is not an effective device for obtaining increased stability or control at the stall for this wing section, and it may be that R.A.F.30 section is not suitable for slotting.

NOTES ON LONGITUDINAL STABILITY AT STALLING IN GLIDING FLIGHT. S. B. Gates, M.A. Presented by the Director of Scientific Research, Air Ministry. R. & M. No. 1189 (Ae. 351). (7 pages and 5 diagrams.) July, 1928. Price 6*d*. net.

Experimental determination of the longitudinal stability derivatives as stalling angle is approached and exceeded is not at present detailed or comprehensive enough to yield a thorough survey of stability in this region. The object of these notes is only to indicate the general nature of the changes which may be expected to occur at and above the stall in gliding flight. The non-dimensional stability notation, explained in R. & M. 1093* will be used.

The analysis is illustrated by calculations from wind tunnel data referring chiefly to S.E.5. The heavy damping of the short period oscillation shows a dangerous collapse, and may disappear if the wing section and arrangement are such that the flow is very critical at stalling. On the other hand, the phugoid damping increases through the stall.

It seems that instability at stalling will depend largely on how critical the flow is round the wing section ; a section which showed a very marked collapse in lift would be expected to suffer a corresponding collapse in rotary damping, and instability would follow unless the tail were exceptionally large. The lift curve of the S.E.5 model has a very gentle reverse slope above stalling and so the calculations are specially favourable. The Bristol Fighter model (R. & M. 932) shows a much more negative slope (Fig. 1). It seems, therefore, that a wind tunnel research on the collapse of lift and rotary damping for various types of wing section and biplane arrangement should be undertaken if it is necessary to study instability at stalling in any further detail.

* A non-dimensional form of the stability equations of an aeroplane. —H. Glauert.

"AL-DUR-BRA" TUBES

We have received from Charles Clifford & Son, Ltd., of Birmingham, an interesting little booklet dealing with the corrosion-resisting properties of a new alloy which has been given the trade name "Al-Dur-Bra," the first application of which has been to condenser tubes. It seems likely, however, that other applications will follow, and aircraft and aero engine firms would do well to watch further developments.

During researches carried out at the Research Department at Woolwich recently, it was discovered that an alloy consisting of 76 per cent. copper, 22 per cent. zinc, and 2 per cent. aluminium, was remarkably resistant to corrosion. Further investigations were undertaken with a view to applying the discovery to the manufacture of condenser tubes, and many laboratory experiments yielded encouraging results. It was found of importance that the tube castings should be produced by the "Durville" process (*i.e.*, a French process for rotary pouring), and although certain difficulties connected with the method of casting and the manufacture of tubes in this alloy were encountered, these were ultimately overcome, and the "Al-Dur-Bra" tubes are now available at a price but little above that of ordinary "70/30" brass tubes.

Exposed for long periods to the action of highly aerated sea water, the "Al-Dur-Bra" tubes show no appreciable attack of corrosion, and exhibit a yellow surface having the appearance of an enamelled or lacquered finish. Further work has shown that this feature is due to the formation of a film or coating of a highly protective nature ; and, moreover, this film appears to possess remarkable "self-healing" properties. Thus, if the film is deliberately abraded, it quickly heals up when the metal is left freely exposed to aerated sea water.

As we have already stated, so far the application of the new alloy has been mainly to condenser tubes, but its non-corrosive properties should make it valuable for use in aircraft, particularly for seaplane work. We are informed that Charles Clifford & Son will welcome correspondence with anyone interested in the new alloy.

PRIVATE FLYING

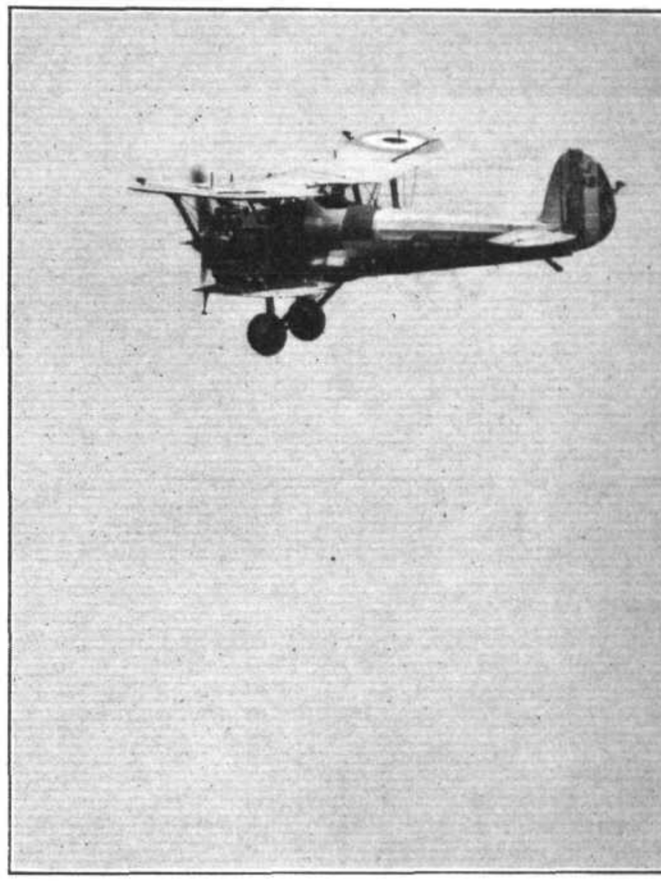
A Section of FLIGHT in the Interests of the Private Owner, Owner-Pilot, and Club Member

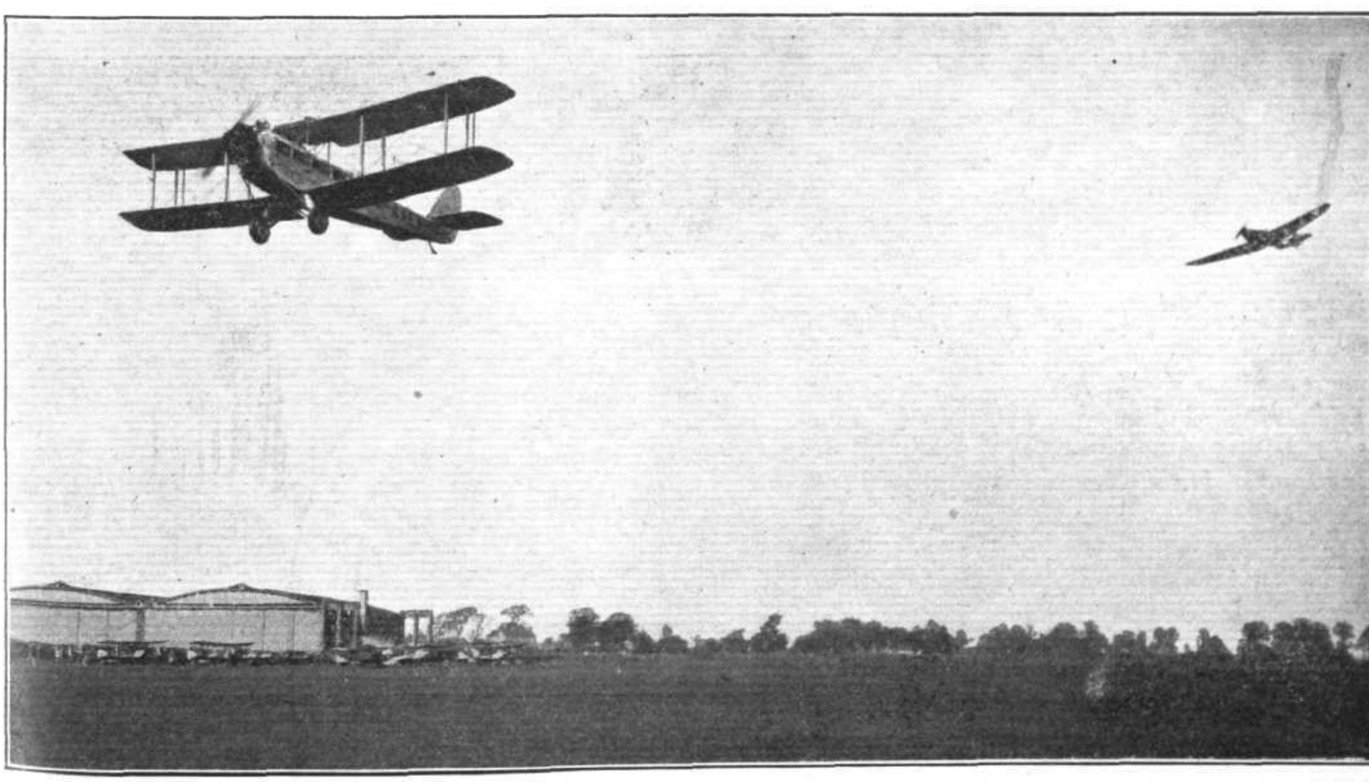
THE DESPREZ CUP COMPETITION

An Amusing Day at the Bristol Club

MR. ALAN S. BUTLER was awarded first place, on his D.H. Gipsy-Moth coupé, and Dr. Whitehead Reid second, on his Westland "Widgeon II" ("Genet"), in the competition for the Desprez Challenge Cup held at the Filton Aerodrome, Bristol, on Sunday last, May 26. This competition was the main feature of the meeting organised by the Bristol and Wessex Aeroplane Club, and provided quite an interesting afternoon's entertainment. A number of prominent people were among the visitors, and variety was lent to the proceedings by the presence of Sir Alan Cobham with his de Havilland "Giant Moth" ("Jaguar"), who was busy taking up passengers. Sir Alan had arrived the day before, and the "Youth of Britain" quickly became a familiar sight to the good Bristolians during its many trips from Filton. Both on Saturday and Sunday the D.H.61 was kept busy, and the geared "Jaguar" engine did not appear to object to being used for such relatively uninspiring work as "joy-riding." There were those who professed to be able to detect in its exhaust a certain angry note whenever, as happened frequently owing to the direction of the wind, the "Youth of Britain" flew over the Bristol factory, but this was probably pure imagination, for aero engines, like sailors, "don't care."

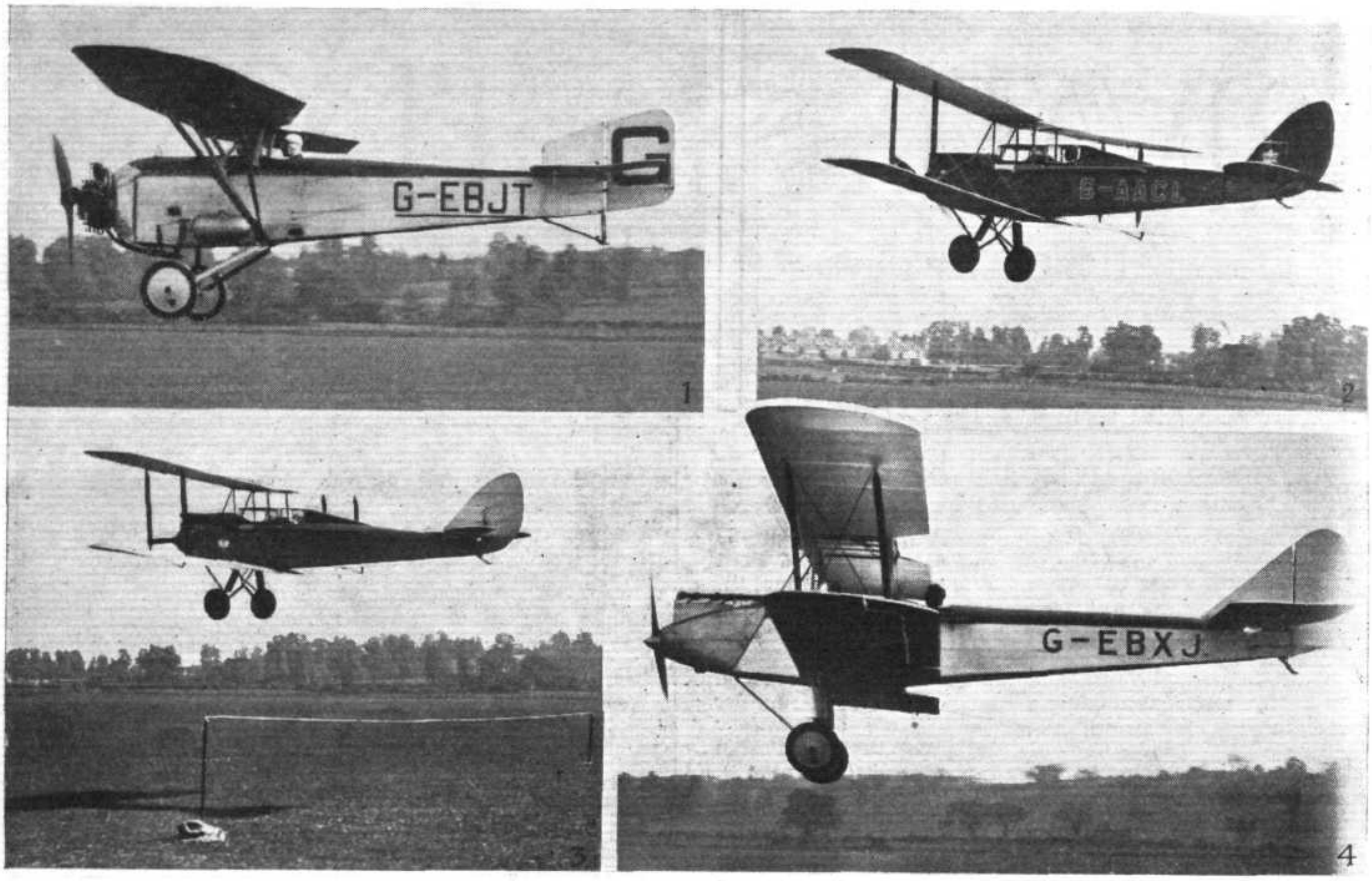
During Saturday afternoon several visitors arrived by air, among them being Jerry Shaw's "Arom" Cirrus-Moth, of "Shell" fame, and "Miss Ethyl," the Westland Gipsy-Widgeon recently acquired by the Anglo-American Oil Co. Capt. Guest was expected to arrive for the competition on





["FLIGHT" Photographs

AT THE BRISTOL CLUB MEETING: Sir Alan Cobham, carrying passengers in his D.H. "Giant Moth" ("Jaguar"), has a "Hun on his tail" in the form of the little Klemm monoplane. In the upper photograph Mr. Cyril Uwins shows off to good advantage the Bristol "Bulldog" ("Jupiter") single-seater fighter.



[" FLIGHT " *Photographs*

LANDING IN THE DESPREZ CHALLENGE CUP COMPETITION : Various styles of clearing the stile. 1, Dr. Whitehead Reid in his Westland " Widgeon II " (Genet), " Wendy." Dr. Whitehead Reid won second place. 2, Mr. Alan S. Butler, in his new coupe Gipsy-Moth. Mr. Butler gained first place. 3, Captain Bayley on his Gipsy-Moth G-AADC ; and 4, Mr. Ashworth, a member of the Nottingham Aero Club, in his Cirrus-Avian.

his Gipsy-Moth, but did not turn up, as far as we were able to ascertain.

Sunday morning came with glorious weather and promise of ideal conditions for the Bristol Club's meeting. By midday Sir Alan Cobham had reminded the population of the existence of Filton and flying, but the good old Bristol custom of giving its tramway workers the day off until 2 p.m. prevented many from getting out to the aerodrome until half-past two. FLIGHT'S representatives, who very unwisely had arrived in Bristol without road transport facilities, " did their bit " towards giving the tramways a doubtless well-earned rest, and for a little while Filton and Bristol seemed very far

[" FLIGHT " *Photograph*

NOTABILITIES AT BRISTOL MEETING : From left to right, Col. Strange (a very " Spartan " gentleman), Lady Apsley, Lord Apsley (M.P. for Southampton), " Whisper," Miss O. T. Miles, Mr. Bartlett (Chief Instructor of the Bristol Club), Mr. Edward Tiarks, and Mr. Hammond Tiarks.

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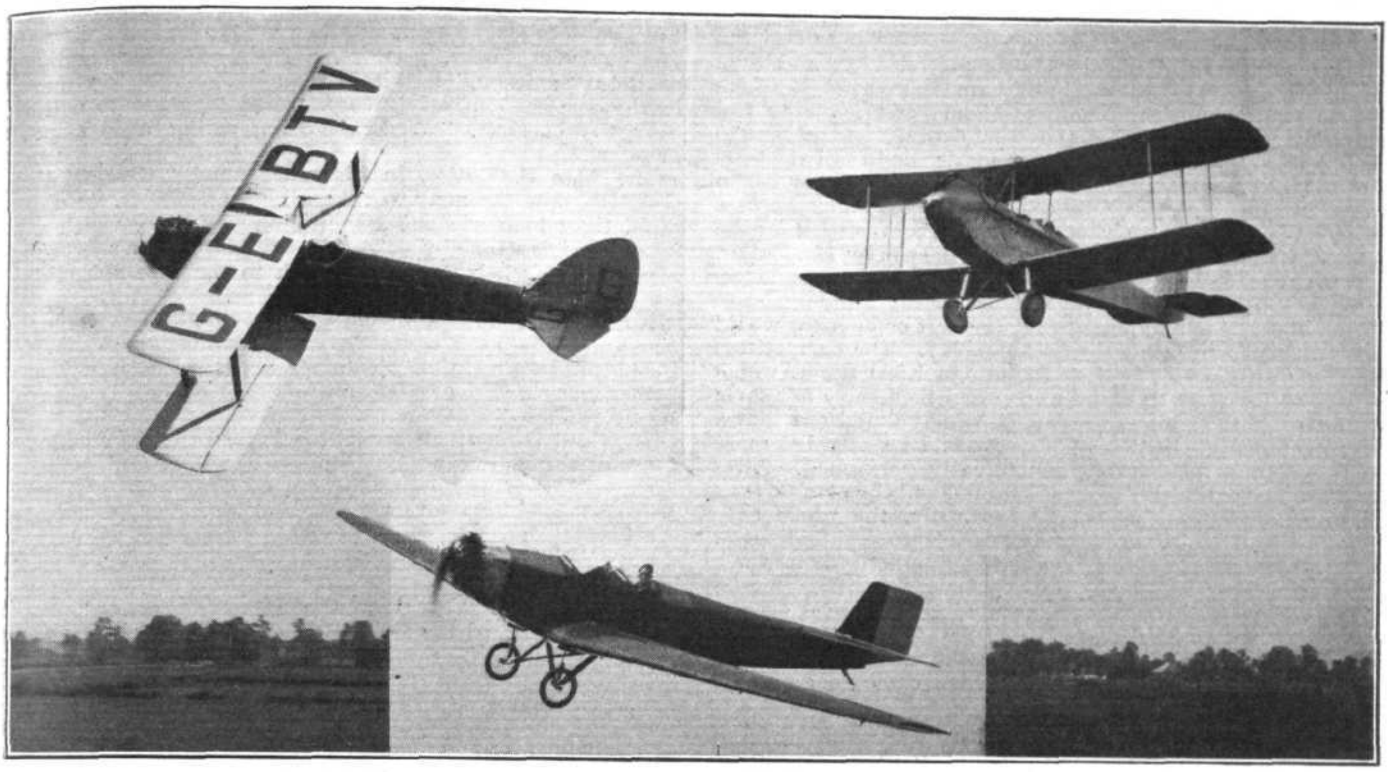
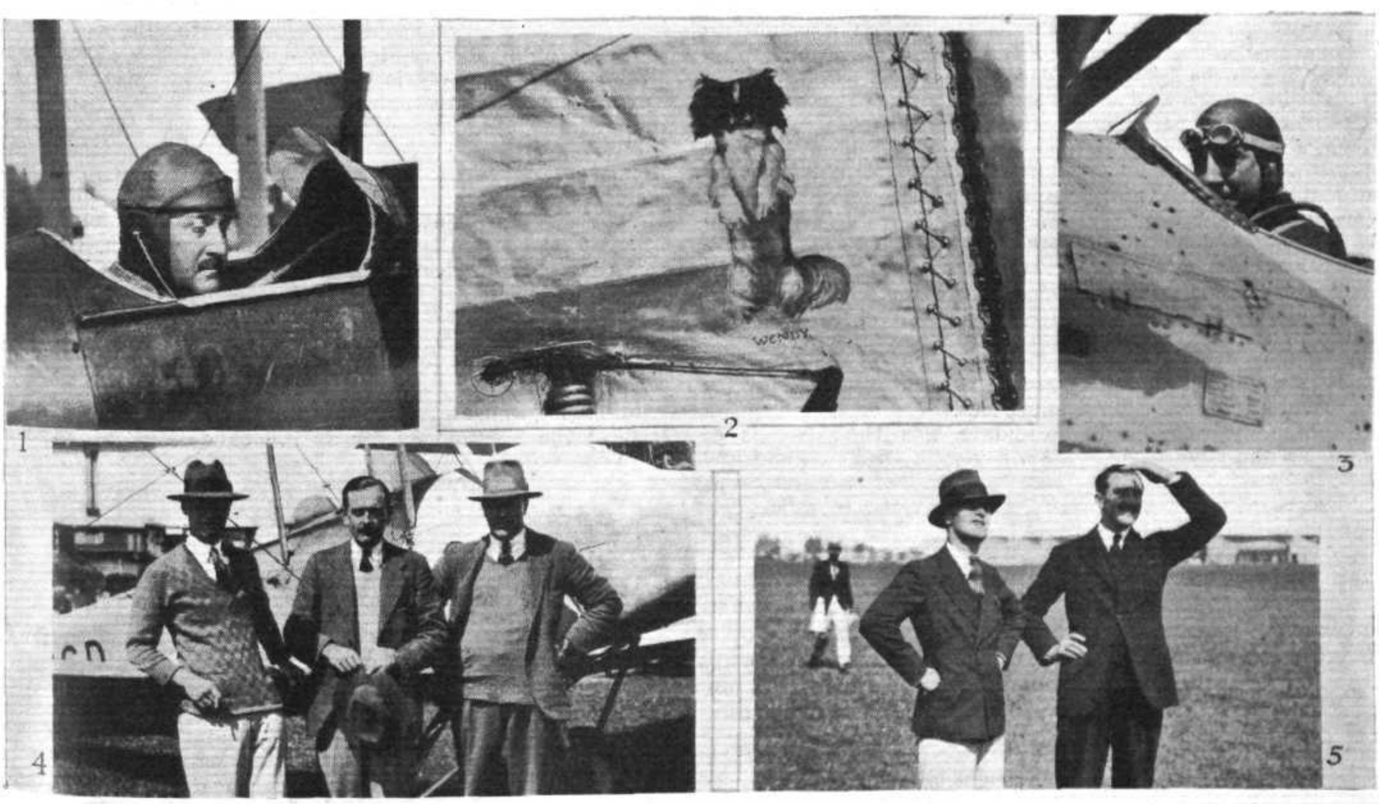


["FLIGHT" *Photographs*

ONE AVIATES AT BRISTOL : Mr. Bartlett is here seen flying two machines (but not at the same time). On the left in the Bristol Club's "Moth," and, when that got a little tired, the Simmonds "Cirrus-Spartan" (right). The little Klemm monoplane with Salmson engine was much in evidence, and is here seen flying low, piloted by Flying Officer Alliott. Later in the day one of the "Moths" charged the Klemm, which was somewhat "bent."

apart. However, Mr. Downes Shaw, chairman of the Bristol and Wessex Aeroplane Club, solved all problems by placing his Sunbeam car and chauffeur at our disposal, and thereafter the rest of the day was sheer enjoyment.

They have a happy knack out at Filton of making their guests and visitors comfortable, and at a light luncheon, with Cyril Uwins and "Peter" Bartlett acting as waiters, and Mrs. Fedden and Mrs. Cooper attending to the catering, luncheon at the club was a very pleasant affair indeed. At a near-by table Sir Alan Cobham and Lady Cobham were busy planning "airmindedness," and every now and then a new arrival by air would be announced, whereupon Bartlett



["FLIGHT" *Photographs*

HOSTS, PERFORMERS, AND VISITORS : 1, Mr. Downes Shaw, Chairman of the Bristol Club. 2, "Wendy," her portrait, painted on the side of Dr. Whitehead Reid's Westland "Widgeon II." 3, a somewhat futuristic portrait of Mr. Cyril Uwins in the cockpit of the Bristol "Bulldog." Mr. Parkinson is popularising aviation down Teignmouth way, and is seen in 4 with two of his pupils, the Hon. R. Westenra (brother of Lady Bailey) and Mr. F. S. Lee. In 5 Mr. Ashley Hall and Dr. Whitehead Reid are seen watching the evolutions of another pilot.

would rush out to greet the new arrivals on behalf of the club, see that their machines were attended to, and then bring the visitors themselves in to share the repast. Nowhere is one made more thoroughly at home and made to feel sincerely welcome than at the Bristol Club, and it was to be regretted that more visitors did not decide to call at Filton for the Desprez Challenge Cup. The meeting was not a very " serious " one, certainly, but it was very well worth a visit. We do not know whether the next competition for the cup will be held at Stag Lane, in view of the win by Mr. Butler, but wherever it is held, it deserves a much larger attendance.

Shortly after 3 p.m. all was ready for the competition to begin, and it was announced that the first competitor would be Mr. Ashworth in his Cirrus-Avian XJ. The competitors were required to take off and climb to 1,500 ft., at which altitude they were to make a loop and then carry out some evolution of their own choosing, it being pointed out that a simple manœuvre well carried out would be awarded more marks than a difficult one indifferently performed. After that the machines were to cruise around and then land over a tape, as close to it as possible. Finally, the whole time occupied had to be as close as possible to eight minutes. The competitor obtaining the greatest number of marks was to be the winner.

Capt. Bayley, who was next, executed a clean large loop, and followed it with a half-roll to the left, a half-roll to the right, a spin, and a slow stalled sinking. Coming in over the tape, he touched in a fairly short distance and came to rest after a short run.

The next competitor was Dr. Whitehead Reid, who was flying his " Genet "-engined Westland " Widgeon II," which he has now christened " Wendy." Having reached his altitude, Dr. Whitehead Reid did a half loop, a sort of Immelmann turn, another loop, a spin, and then a " falling leaf " descent. His evolutions were, perhaps, a little ambitious and not entirely " finished," but it is thought that he lost marks in the competition mainly through the long run to pull up over the obstacle, " Wendy " being rather a high-speed machine.

Mr. Alan S. Butler, in his new coupé " Gipsy-Moth," G-AACL, was the next to take off. At 1,500 ft. he did a rapid tight loop without any preliminary dive, which was followed after a time by slow stalled sinking, and a short spin. He judged his height and approach to the tape splendidly, and came to rest in a fairly short distance.

An interval followed, during which the little Klemm monoplane with Salmson engine gave an exhibition, while Mr. Bartlett took up Col. Strange's " Cirrus-Spartan " and gave a very fine demonstration of trick flying, " skating " across the aerodrome, etc.

Mr. Cyril Uwins then brought out the Bristol " Bulldog " single-seater fighter with " Jupiter " engine, and gave an extraordinarily pretty exhibition of airmanship. Loops, rolls and spins followed in quick succession, but perhaps the prettiest items in a series of very " finished " evolutions were the upside-down flights, and the slow rolls at a low height.

But two competitors for the Desprez Cup remained: Mr. Culverwell, of the Bristol Club, and Mr. Leete, of the Liverpool Club. The former was flying the Bristol Club " Moth," YH, and the latter the Liverpool " Cirrus-Avian," XY. The Avian's wheels touched the tape and thus put this competitor out of the running, while the number of marks gained by Mr. Culverwell was insufficient to gain him a place. The final award was, as already stated, Mr. Alan S. Butler first, and Dr. Whitehead Reid second.

TOURING CONSTITUENCIES BY LIGHT 'PLANE

MANY of the candidates who contested at the General Election are well known to our readers as private owner pilots. Their experience of flying has been very useful to all of them, particularly in the extremely scattered divisions such as exist in Scotland. Then there is no doubt that the novelty of flying round the country to political meetings helped to attract greater audiences. No doubt, too, the cockpit has been an excellent impromptu platform when a candidate encountered an unexpected opportunity of creating a meeting. The strain on the flying candidates in the fight will have been less than on those who rushed round in cars.

Whilst flying between meetings their throats will have found a welcome nectar in the purer air of altitudes. Private flying and light 'plane activity generally should have an advantage if these flying candidates have been returned. One knows that Capt. H. H. Balfour at least intended to make aviation his special concern if returned for Thanet.

He has been using his Cirrus-Moth to fight that division in the Conservative interest, and has probably put more work into this election that any other candidate. It is months ago now that he commenced flying round the division. He was formerly general manager of Metal Propellers, Ltd., and last year he wrote a timely article in FLIGHT on the utility of private flying for business purposes.

Another private owner candidate was the Marquis of Douglas and Clydesdale, who is a very keen sportsman and is equally well known for his boxing as for flying. He flew his Gipsy-Moth to contest Argyllshire as a Conservative, and was assisted by his sister, Lady Mary Douglas-Hamilton, who is also a pilot.

Capt. F. E. Guest used his Gipsy-Moth while fighting for the Liberal cause in Bristol North.

Mr. Hylton Murray-Philipson, a nephew of Lord Elibank, fought the division of Peebleshire and South Midlothian with the help of his Cirrus-Moth, which was especially useful, although that country is extremely mountainous; but he cleverly contrived to make his meetings in the vicinity of the few landing grounds which exist there.

Mr. W. E. Allan, Unionist candidate for West Belfast in the Imperial Parliament, made many flights between Baldonnel and Aldergrove aerodromes and other places in Mr. O. E. Esmonde's privately owned Gipsy-Moth. One believes that Mr. Allan had not previously flown, but that this recent experience has made him very enthusiastic about light 'planes. Capt. H. M. Yeatman flew his own Cirrus-Moth to help Maj. F. M. Dougall contest Hereford in the Liberal interest. Maj. F. M. Dougall is on the staff of the *Daily Express*.

If the municipal aerodromes now foreshadowed had been ready, flying would have played, perhaps, the biggest transport part in the Election as far as the candidates' movements were concerned.

FRENCH LIGHT 'PLANE MOVEMENT

THOSE who care for aviation in France often express envy of our light 'plane movement in the form of subsidised clubs and independent private flying. French light 'plane manufacturers have produced, perhaps, as many types of light 'planes as we have, but so far, it has not resulted in the country becoming airminded to the same extent. One reason, for sure, is the lack of clubs for training pilots, for an extensive club movement must arise in a country before light 'planes can find a market. There are now signs of a parallel movement starting, however, and we have just received information of a club at Le Mans known as the Club d'Aviation Légère Wright-Bollée, of which M. Henri Delgrove is temporary secretary. It was at Le Mans that the Wright Bros. made their first flights in Europe. That is the reason why their name, and that of the man who made them known in France, M. Léon Bollée, of motor-car fame, are incorporated in the club's title.

Although this club only started in January, there is already a membership of 250. Financial difficulties, state the secretary, have limited progress at the start, as with all new clubs, but they include amongst their accomplishments so far, a light aeroplane and scientific kites for aerial photography. One interprets this as meaning that they have built these machines for constructional experience, for the secretary also states that they are awaiting a better financial condition in order to buy a light aeroplane of a well-known manufacturer to commence flying instruction and flying generally.

Members have also attended lectures on aviation in the meantime. It is hoped that this movement at Le Mans will lead to the use of the aerodrome for future air lines

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between England and Spain and Paris and Brest, for which purpose the assistance of the Le Mans Chamber of Commerce is mentioned.

Little or no help is granted such clubs in France by the French Government. Private visitors from England are welcomed at Le Mans. There is provision, we are informed, for the use of mechanics and of sheds at the Polygone du Mans. Accommodation will also be booked at the best hotels in the town if desired, providing that advance requests are made. They asked us particularly to give this invitation to FLIGHT readers, and also request practical hints on the formation of clubs from the experienced English Clubs.

[NOTE.—If light 'plane manufacturers in this country would care to bring particulars of their machines to the direct notice of the Le Mans Club, we shall be pleased to make the necessary communication.—ED.]

LIGHT 'PLANE CLUBS

LONDON AEROPLANE CLUB

(MAY 19–24.)—Instructor: Major H. G. Travers. Ground Engineers: C. Humphreys and A. E. Mitchell. Aircraft: The following machines were in commission—G-AABL, G-AABH, G-EBZC, and G-AAEX. Total flying time for the week: 78 hrs. 40 mins. Dual instruction: 37 members received dual instruction, the time being 39 hrs. 30 mins. Solo flying: 31 members flew solo, the time being 39 hrs. 10 mins. G. Gibbins and S. A. Mumford made their first solo flights on the 24th inst. Mr. Gibbins was at one time on the ground staff of the club, and is now chief mechanic to Mr. J. Scott-Taggart.

Pilot Instructors: Capt. F. R. Matthews, acting under the doctor's orders, has not been flying during the past fortnight. It is hoped he will resume his duties as pilot instructor next week. This has thrown a large amount of instruction work on Major Travers, who has put in 62 hours during the last ten days. The club is much indebted to Mr. A. G. Store, a member, who has been assisting Major Travers during this period.

Club House.—Donation of £1 1*s.* from Mr. R. D. Cooper. Silver tankard from Capt. W. L. Hope.

R.A.F. Display. Hendon, Saturday, July 13, 1929. The Royal Air Force Display Committee have agreed to allow members of the London Aeroplane Club to purchase two tickets for the 10*s.* enclosure at 5*s.* each. In order to obtain this privilege members must purchase their tickets beforehand, through the club. This reduction does not apply to motor cars, for which there is an additional charge of 7*s.* 6*d.* per car.

Members are requested to apply for the tickets at the club at Stag Lane Aerodrome, Edgware. All applications must be accompanied by remittance to cover the cost of the tickets. *Members are not entitled to apply for more than two tickets.*

CINQUE PORTS FLYING CLUB

(MAY 12–18).—Pilot instructor: Mr. K. K. Brown. Ground engineer: Mr. R. H. Wynne. Machines in Commission: Moths R.I. and P.M. Total hours for week: 22 hrs. 25 mins. Dual: Mr. Ellis, 6 hrs. 15 mins.; Mr. Richardson, 4 hrs.; Mr. Lillingston, 1 hr.; Mr. R. Dallas Brett, 15 mins.; Mr. Reid, 1 hr. 30 mins.; Mr. Hume, 2 hrs.; Mr. Whittingham, 45 mins.; Mr. Higgett, 30 mins.; Mr. Fisher, 2 hrs.; Lt.-Comdr. Gubbins, R.N., 1 hr.; Mr. Johnstone, 1 hr. Total, 11 members, 20 hrs. 15 mins. "A" pilots; Mr. R. Dallas Brett, 15 mins.; Mr. Douglas, 45 mins. Tests: 10—1 hr. 10 mins.

Flying time continues to rise and two more new members, Mr. Fisher, of Dover, and Mr. Johnstone, of Gravesend, commenced instruction during the week. Two more flying members joined the club during this week.

The club lawn and garden is in working order and we anticipate that tea on the lawn will soon become a popular week-end feature.

(MAY 19–25).—Total hours for week: 33 hrs. 15 mins. Dual: Mr. Whittingham, 2 hrs.; Mr. Edgson Wright, 30 mins.; Mr. Ellis, 4 hrs.; Mr. Wood, 15 mins.; Mr. Richardson, 2 hrs.; Mr. M. Braddell, 45 mins.; Mr. Fisher, 4 hrs.; Mr. Cox, 30 mins.; Mr. Reid, 1 hr.; Mr. Lillingston, 1 hr.; Mr. Hume, 2 hrs.; Lt.-Cdr. Gubbins, R.N., 1 hr. 30 mins. Total, 12 members, 19 hrs. 30 mins. Soloists under instruction: Mr. Richardson, 1 hr. 45 mins.; Mr. Ellis, 30 mins. Total, 2 members, 2 hrs. 15 mins. "A" pilots: Mr. Edgson Wright, 1 hr.; Mr. Braddell, 15 mins.; Mr. Somerset, 2 hrs. Mr. Payn, 45 mins. Mr. Douglas, 30 mins.; Mr. R. Dallas Brett, 1 hr. 20 min. Total, 6 members, 6 hrs. 50 mins. Special journeys to Croydon and return, 1 hr. 30 mins. Joyrides: 2, 20 mins. Tests, 13, 1 hr. 20 mins.

This week easily beat all previous club records, both for the number of members who flew and of hours, which we regard as very satisfactory for two machines.

Several of our "A" pilots tried out the new machine P.M. and most of them are agreed that she is exceedingly satisfactory and very nice to fly.

One of our club trained members, Mr. Graham Mackinnon, has purchased an "X" type moth G-EBVK and visited the club in it on Saturday from London. Another of our members, Mr. Law, also arrived on Saturday in his yellow Moth G-EBYJ. Further visitors during the week were Mr. and Mrs. Chalmers in their smart green and white Gipsy Moth "Cygnet" and Mr. Niewenhuizen, from Brooklands, in his red Moth G-AAAG, also one of the club trained members, Mr. G. E. F. Story in his Moth G-EBTZ. Mr. Gough of Norfolk and Norwich club arrived in an Avian on Sunday with Mr. Brett, also of the Norfolk Club in a Moth.

On Saturday, R.I. was flown to Croydon for complete engine overhaul by Mr. R. Dallas Brett, accompanied by Mr. Brown in P.M. which returned the same evening. The time from Croydon to Lympne with two up being 40 mins., which is better than average. Messrs. A. D. C. Aircraft have promised to put this overhaul through as quickly as possible, and we hope to see R.I. back again in service under a fortnight.

During the week Mr. Richardson of London and Mr. Ellis of Folkestone, were successfully launched solo. These were Mr. Brown's first two pupils, and they performed very satisfactorily. We expect to have four or five more pupils solo during this week.

The Company's first annual general meeting, will be held at 5.30 p.m.,at 114, High Street, Hythe, Kent, on Tuesday, the 28th inst. The accounts for the period in question (*i.e.* from February 15, 1928, to March 31, 1929) show a profit of £96 12*s.* 7*d.*

The sweep for the seat in the club machine which is to fly at the Rotterdam meeting at the end of next month, was won by Mr. K. Edgson Wright of Ashford.

HALTON AERO CLUB

(MAY BULLETIN).—*Cardington.*—A visit was arranged for Wednesday, May 29, to the Royal Airship Works, Cardington, to inspect the R.101.

Northampton.—The H.A.C.2, or "Minus," after reconditioning, has been entered for the Northampton Pageant on Monday, 20th. A test flight was made on Thursday, 16th, by Flight-Lieut. Trench, who was very satisfied with the performance.

H.A.C.3.—Entry has been made for the King's Cup Race, and evening work is commencing in an effort to have it completed in time.

Supermarine "Sparrow."—The light aeroplane, the "Sparrow," has very kindly been offered to the club by Messrs. the Supermarine Aviation Co., Ltd. Arrangements are being made for its transport to Halton, where it will be reconditioned.

LANCASHIRE AERO CLUB

(MAY 12–18).—Flying time: 44 hrs. 5 mins. Instruction (17), 10 hrs. 35 mins. Solo flights (25), 19 hrs. 30 mins.; passenger (30), 11 hrs. 50 mins.; tests (13), 2 hrs. 10 mins.

Instruction. With Mr. Hall: Maxwell, Paddock, Kay, Ashworth, J. H., Davison, Stern, Forshaw, Foote, Dewhurst, Hardy, Greg, Taylor, S., Barlow, Ashworth, W., Lister, Dane. With Mr. Cantrill: Maxwell. Machines in commission: QL, MQ, XD, EC.

Soloists (under instruction): Maxwell, Goss, Stern, Forshaw, Paddock, Barlow, Ashworth, N., Sellers.

Pilots: Garner, Meads, Hardy, Tweedale, Weale, Hall, R. F., Michelson, Williams, Davison, Mills, Fallon, Goodfellow, Nelson, D., Whitehouse, Gort, Lacayo, Gattrill. Passengers.—With Mr Goodfellow: Miss Einerson, Henbrow, Romary. With Mr. Mills: Warburton, Cliffe, Goss, Sellers. With Mr. Lacayo: Miss Palmer, Bewick, Benson, A. Maxwell. With Mr. Meads: Goss. With Mr. Hall, R.F.: Garner, Williamson, Mills, Hall, C. A., Miss Owen, Miss Barratt, Pemberton, Frith. With Mr. Scholes: Cantrill, Barlow, Hall. With Mr. Cantrill: Travis, Miss D'Andria, Machin. With Mr. Hall: Percival. With Mr. Gattrill: Ryder, Lacayo. With Mr. Williams: Simpson.

Excellent progress with tests was made by the soloists under instruction, but we have again been unfortunate with our machines.

Our Moth G/EBMQ, which completed a thousand hours' flying not long ago, was rather badly damaged owing to being started up with the throttle too far open. She charged the railings of the Club enclosure, and stood on her nose. Mr. Paddock had a forced landing on G/EBQL owing to engine failure. This was his fourth attempt to accomplish his height test. On the first occasion he went to well above the necessary height only to find that the barograph had failed to register. Ever since then ill-luck seems to have dogged his footsteps (or slipstream) each time he attempts the test. Mr. Meads also had a forced landing owing to an air lock when returning from Hooton. He was able to bring the machine safely back to the Aerodrome, however, in due course.

MIDLAND AERO CLUB

(MAY 12–25).—The total flying time was 68 hrs. 24 mins. Dual, 30 hrs. 25 mins.; solo, 21 hrs. 5 mins.; passenger, 14 hrs. 40 mins. test, 2 hrs; 14 mins.

* The following members were given dual instruction by Flight-Lieut. T. Rose, D.F.C., and Mr. W. H. Sutcliffe:—R. G. Welch, G. Norton, K. S. Neale, Maj. D. Thomson, Dr. W. G. Tilleke, L. W. Farrer, F. G. Robinson, F. T. Lydall, R. O. Wilcoxon, H. A. Taylor, A. F. Hill, P. B. Hackett, L. V. Mann, T. W. Wild, W. Smith, J. Hanford Stevens, Capt. J. C. Chaytor, C. Blakeway, G. P. Haylock, E. C. Merrick, T. G. Ellison. Advanced dual:—G. E. C. Hill, H. J. Willis, S. Duckitt, R. C. Baxter.

"A" Pilots:—S. H. Smith, E. P. Lane, W. M. Morris, J. K. Morton, R. L. Jackson, J. Rowley, J. J. Willis, S. Duckitt, G. V. Perry, R. C. Baxter, R. D. Bednell, W. Swann, J. Cobb, W. L. Handley.

Soloists:—H. E. Evans, Dr. W. G. Tilleke, P. B. Hackett, L. V. Mann, G. P. Haylock, T. W. Wild, A. E. Coltman, R. O. Wilcoxon.

Passengers:—W. Breedon, Miss D. Buss, R. Taylor, T. W. Ashford, N. R. Greathead, J. Murtagh, H. T. Testar, O. W. Banwell, J. E. Yardley, A. G. Aproston, J. C. Burrows, Mrs. W. G. Tilleke, M. Blakeway, Miss E. Beldon, A. C. Cox, Mrs. Griffin, A. Methley, Miss K. Meugens, G. H. Smart, W. H. Craven, H. A. V. Hill.

Mr. P. B. Hackett passed the flying tests for his "A" licence. Messrs. T. W. Wild and R. O. Wilcoxon made first solos.

NEWCASTLE-UPON-TYNE AERO CLUB

(MAY 13–19).—Instructor: G. M. S. Kemp. Engineer: J. Brittain; assistant, J. Tait. Aircraft (three): PT, LX, QV. Total flying time, 36 hrs. 55 mins. Instruction, 19 hrs. 55 mins.; "A" pilots, 4 hrs. 30 mins.; solo training, 5 hrs. 10 mins.; passengers, 7 hrs. 10 mins.; tests, 10 mins.

Last week we were favoured with a visit from the *Daily Mail* 'plane, which landed at the aerodrome for a few hours and then took off again with four passengers. Mr. Chalmers, of London, called on his way to Glasgow for fuel.

(May 20–26).—Flying time, 41 hrs. Instruction, 29 hrs. 40 mins.; "A" pilots, 7 hrs. 45 mins.; passengers, 3 hrs. 15 mins.; tests, 20 mins.

A farewell dinner was held for K. C. Brown on Wednesday, May 22, who was leaving to go to the service depot of De Havillands. A suitable presentation was made.

YORKSHIRE AEROPLANE CLUB

(MAY 19–25).—Pilot instructor: Flight-Lieut. H. V. Worrall, D.S.C. Ground engineer: R. Morris. Assistant ground engineer: G. Speight. Machines in commission (3): SV, RF, and BD. Flying time for week: 80 hrs. 55 mins. Instruction (18), 16 hrs. 15 mins.; soloists (8), 14 hrs. 40 mins.; "A" pilots (17), 40 hrs. 40 mins.; passengers (69), 8 hrs. 40 mins.; test flights (5), 40 mins.

This week's flying time, 80 hrs. 55 mins., has broken all previous records.

On Whit Monday we held a very successful flying and grass-track racing meeting.

Mr. Parks and Mr. S. Fields performed very creditable first solos.

Miss Ellison, Mr. Parkinson, and Mr. Pollock completed their tests for their "A" licence.

EDDIES

RATHER rough on the Under-Secretary of State for Air, Sir Philip Sassoon, if it be correct that two women Parliamentary candidates who are fighting each other should have selected Sir Philip's constituency in which to throw down the gage of war, thus weakening everybody's position by a three-cornered fight. Obstinacy without reason has always brought about results very far from the wishes or thoughts of the obstinate ones—and the more the pity. Let the best " man " win, by all means, but encourage the crowd to butt in and in the resulting scrimmage find that the wrong man has scored.

A " DRESS REHEARSAL " of bombing from the air, recently perpetrated over New York, during which Governor's Island, in New York Harbour, the headquarters of the 2nd Army Corps, was " annihilated " by a big Army bombing 'plane dropping a " theoretical " load of 2,000 lb. of explosives, appears to have created a vast sensation amongst those who were not wise in connection with the military manœuvres which have been in operation. The bomber had travelled from Fairfield (Ohio), some 700 miles away, and by means of wireless had made a very successful night " attack "—the entire operations being considered a good test of efficiency. Apparently, the effect of the bombs and 'planes was alarming to the ordinary New York citizen, and may possibly have given them an idea of what the real thing meant to London in the 1914–1918 days *and* nights, whilst natural instinct appears to have at once suggested " take cover " tactics amongst the more timid, who, amongst other havens, dumped down their fares for admission to the subway railway stations.

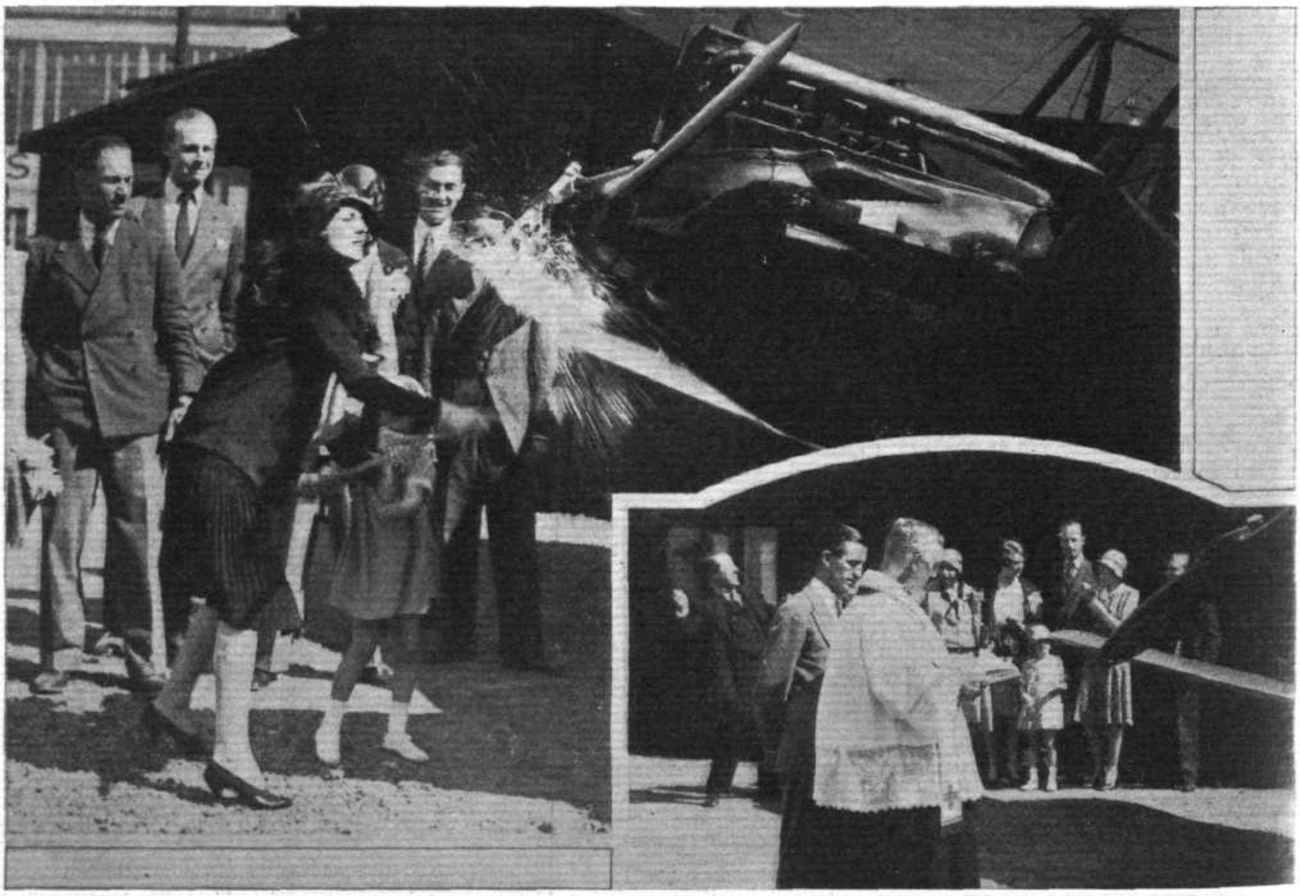
BY way of pleasant contrast to our home obstinate refusal to help the Air Mail with an issue of Air Mail stamps, comes the announcement that the Australian Postmaster-General has arranged for the issue of Air Mail Service stamps for the air routes within Australia. But then the Australian Government have not the same white-whiskered notions to keep back enlightened advance with the times.

THESE stamps will be printed by steel engraving process, on unwatermarked paper, coloured mid-green. The subject of design is a pastoral scene, and the stamps valued at 3*d.*, were to be on sale at the principal post offices in Australia on May 20. Supplies will be available at the Postmaster-General's Department, Melbourne. The stamp cannot be used in prepayment of surcharge on correspondence from other countries; such prepayment must be made in stamps of the country of origin.

GRACIOUS Goodness! Pertinacity in our Inland Revenue collectors is proverbial: but it should give them a sick headache from envy to hear how their French brethren attempted to follow-up poor Charles Nungesser, who passed out with M. Coli, in their attempt, two years ago, to fly the Atlantic—" Unless you pay immediately the sum of 4 francs 21 centimes income-tax you will be prosecuted " are the translated words of the notice addressed by the French income-tax authorities to M. Nungesser. At least there is the one bright reflection attaching to this " episode," that we all wish Nungesser were here to answer in person. If anything could bring him to life again, that notice should.

FROM Radlett, in Hertfordshire, another plaintive cry comes anent B.B.C. announcing. Thus Mr. J. M. H. Goodwin: "Could you give me space to ask if others beside myself revolt at meeting references to ' airplanes '? The announcer the other night went out of his way to talk of an ' airplane ' over the wireless, and I feel that the time is ripe for protest. Apt as the word may be, it is not English, only journalese." Unfortunately, " airplane " is also Air-Ministryese.

AEOLUS.



[" FLIGHT " Photograph

STAG LANE CHRISTENING CEREMONY: The wife of the Marquis de Casa Maury christening his Coupé Gipsy-Moth at Stag Lane Aerodrome on May 25. The name bestowed on it is " Toi et Moi." In the top group of interested spectators are (left) Mr. O. W. H. Cooke, and (behind the splash) Mr. Ballantyne and Capt. H. Broad, all of the De Havilland Aircraft Co., Ltd. In the lower picture the Roman Catholic priest is seen blessing the machine, with the Marquis de Casa Maury beside him. The Marquis, who has recently learned to fly at the De Havilland Flying School, is the well-known racing motorist, and managing director of Bentley Motors, Ltd.

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TYRES must bear and absorb the initial shock. Wheels must be of tremendous strength, and the fitting arrangements such that the Tyre cannot be thrown from the rim.

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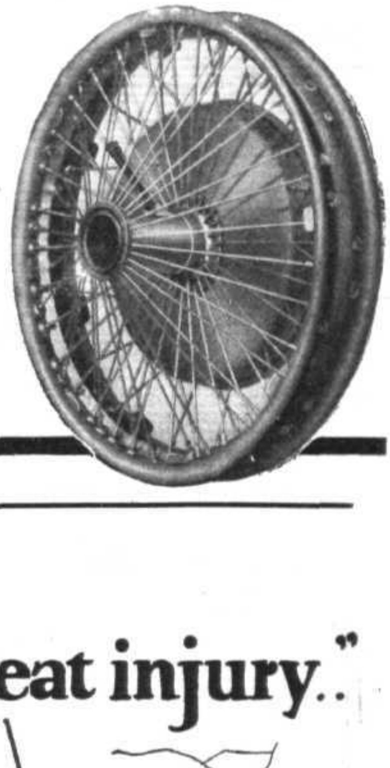

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"I feel that Triplex has saved me from very great injury..."

Kensington
17th April 1929

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W. 1.

Dear Sirs,

A few days ago while I was driving along an open stretch of the Great North Road behind a lorry, a pair of partridges came over a low hedge behind a lorry. One of the birds came right into my windscreen and cracked it in the remarkable manner shown by the accompanying photograph. Not a splinter of glass came out of place although I was travelling at about 50 m.p.h. at the time. I am certain that had I been using ordinary glass it would have come back in my face and caused a very serious accident.

I have always used Triplex but have never before seen it really tested. I am now convinced that what you claim for it is no more than the literal truth. As I feel that your glass has saved me from very grave injury I shall be glad if you will use this letter in any way you like.

Yours faithfully,
"Appreciative".

Fit

"TripleX" Reg'd.

-and be safe!

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TRIPLEX SAFETY GLASS CO., LTD., 1, ALBEMARLE STREET, LONDON, W.1.

Save time by using the Air Mail.

THE ROYAL AIR FORCE

London Gazette, May 21, 1929.

General Duties Branch.

The follg. are granted temp. comms. as Flying Officers on attachment for duty with R.A.F. (May 12) :—Lts., R.N.—D. R. C. Hodson, P. Somerville, A. G. Poe. Sub-Lts., R.N.—H. M. King, J. W. Hale, S. W. D. Colls, J. A. D. Wroughton, P. A. Booth.

The follg. Pilot Officers on probation are confirmed in rank :—A. Haywood, A. M. Cowell (March 9) ; J. Beaumont, R. Chadwick, W. J. Crisham, R. S. Darbyshire, F. P. Donovan, H. J. Forster, O. I. Gilson, H. T. Lines, V. H. Nicolay, J. S. Pole, G. E. F. Proctor, J. B. W. Pugh, N. X. Sheldrick, F. B. Taylor, R. F. A. W. Williams (March 16) ; A. D. Jaffé, R. V. Redpath (March 21) ; E. G. Banham, T. R. Hope, J. A. Harris, R. Mountain (April 3) ; J. H. Lock (April 4) ; J. Addison, F. R. Balfour, D. A. L. Campbell, H. H. Chapman, C. G. Davies, P. Le M. C. Deacon, J. W. Hawke, F. R. Jones, W. H. Jones, H. Kerr, H. D. McGregor, G. F. Macpherson, M. N. Oxford, H. J. A. Williams (April 13) ; M. I. Barnett, E. S. Greenwood, A. N. E. Hall, L. H. Snelling (April 15) ; B. S. Bramble (April 26) ; F. C. G. Freeman, C. P. Hanlon (May 4).

Group Capt. S. A. Hebden, O.B.E., is placed on half-pay list, Scale A (May 17) ; Flight-Lt. H. H. James, O.B.E., is placed on half-pay list. Scale B (May 20 to June 30 inclusive) ; Flight-Lt. A. L. Chick, A.F.C., is placed on retired list at his own request (May 12) Flying Officer G. J. Davies is placed on retired list (May 17) ; Flight-Lt. C. J. Brockbank, M.B.E., is placed on retired list and is granted permission to retain the rank of Sqdn. Leader (May 22) ; Flying Officer H. D. Gunton relinquishes his short service commn. on account of ill-health (May 1).

The short service commn. of the follg. Pilot Officers on probation are terminated on cessation of duty (May 21) :—G. M. Payne, G. H. Robertson. Flight-Lt. D. J. Stewart (Capt. Y. and L. Regt.), relinquishes his temp. commn. on return to Army Duty (May 12). (Substituted for *Gazette* May 14.)

Stores Branch.

The follg. Pilot Officers on probation are confirmed in rank and promoted to rank of Flying Officer (April 28) :—G. Matthews, M. J. Scott, L. F. Oldridge, J. S. French, P. Denehy, P. V. Edwards, H. E. Freeston.

Flying Officer E. G. Jolliffe is placed on retired list at his own request (May 13).

Accountant Branch

Flight-Lt. R. E. Barrett is transferred to Reserve. Class C (May 16); Flying Officer J. R. Thomas resigns his permanent commn. (May 13).

RESERVE OF AIR FORCE OFFICERS

General Duties Branch

The follg. are granted commns. in Class AA (ii) as Pilot Officers on probation :—C. G. Fraser, J. E. Walker (May 6). Pilot Officer T. S. Dykes is promoted to rank of Flying Officer (May 21) ; Pilot Officer on probation J. Paton is confirmed in rank (May 13) ; Sqdn. Leader C. D. Stewart is transferred from Class BB to Class C (May 18).

The follg. are transferred from Class A to Class C :—Flight-Lt. H. Hemming, A.F.C. (Oct. 12, 1928) ; Flight-Lt. W. J. Umpleby (Jan. 5). (Substituted for *Gazette*, May 14). Flying Officer B. Martin (May 11). The follg. Flying Officers relinquish their commns on completion of service :—G Thornton-Norris (Feb 22), H. W. G. Trotman (May 5).

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the Royal Air Force are notified :—

General Duties Branch

Group Captain R. C. M. Pink, C.B.E., to School of Tech. Training (Men), Manston, to Command, 17.5.29.

Wing Commander M. Henderson, D.S.O., to H.Q., Cranwell, supernumerary, 4.5.29.

Squadron Leaders : G. F. Breese, D.S.C., to H Q., Halton, 1.5.29. H. K. Thorold, D.S.C., D.F.C., A.F.C., to Air Ministry (D.O.S.D.), 4.5.29.

Flight Lieutenants : C. B. Wincott, to No. 22 Sqdn., Martlesham Heath, 9.5.29. E. I. Bussell, to H.Q., Iraq, 21.4.29.

Flying Officers : A. M. Watts-Read, to No. 28 Sqdn., India, 3.5.29. de L. Cooke, to No. 31 Sqdn., India, 3.5.29. G. H. Huxham, to Station H.Q., Bircham Newton, 14.5.29. J. W. Busteed, to No. 111 Sqdn., Hornchurch, 18.5.29. T. G. Pike, to Central Flying Sch., Wittering, 6.5.29.

Pilot Officers : G. F. Overbury, to No. 84 Sqdn., Iraq, 12.4.29. A. C. Mitchell, to No. 55 Sqdn., Iraq, 5.4.29. E. M. F. Grundy, to No. 403 Flight, China, 2.5.29. A. L. Weait, to No. 8 Sqdn., Aden, 4.5.29.

Stores Branch

Flying Officer L. F. Caunter, to School of Army Co-operation, Old Sarum, 7.5.29.

Pilot Officer F. G. Lee, to No. 4 Sqdn., S. Farnborough, 8.5.29.

Accountant Branch

Flying Officer K. A. Jackman, to No. 84 Sqdn., Iraq, 19.4.29.

Medical Branch

Squadron Leader D. G. Boddie, M.B., to H.Q., Iraq, 15.4.29.

Chaplains' Branch

Revd. W. R. Marsh, to Station H.Q., Upavon, 1.5.29, on appointment to a short-service commission.

NAVAL APPOINTMENTS

The following appointments were made by the Admiralty on May 22 :—

Promotions

Sub-Lieuts. (F/O R.A.F.).—G. R. Maw, N. S. Luard, and A. G. Poe, to rank of Lieut. (seniority, May 1).

"R. 101" HOLDS AN "AT HOME"

Royal Aeronautical Society Visit to Cardington

MEMBERS of the Royal Aeronautical Society and their friends spent a very enjoyable and interesting afternoon on Saturday last when they paid a visit to the Royal Airship Works at Cardington, Bedford, to see H.M. Airship "R.101." This huge rigid airship, some 724 ft. in length, is now nearing completion, and this was the last opportunity of viewing the structure before its 16 gas bags, containing in all 5,000,000 cubic ft. of hydrogen, are installed. Most of us made our journey to Cardington by road—and a very pleasant journey too—and on arriving at the Airship Works we first saw some of the minor mysteries of "R.101," such as the manufacture of the gas bags and outer covering in which Goldbeaters skin is employed, gas valves, etc. We then walked across to the huge shed containing the airship itself.

We do not propose to make this an opportunity for a full detailed description of the airship—in the first place our visit was purely a private and informal affair, and secondly details of "R.101" have already been published in FLIGHT (*see Aircraft Engineer*, November 29, 1928). We will, however, put on record our impressions of this visit and refer briefly to some of the more oustanding features. The whole of the framework of the hull is complete and erected, and with the exception of the strips at the main girders the outer covering is in place. The gas bags, although finished, have not yet been put in the hull.

Only the control car—which is located beneath the hull a little more than one-third the total length from the nose—was in position, but the five engine "eggs" were not in situ. Each of these power "eggs"—two located port and starboard forward, another two amidships, and a single one at the rear, all suspended below the hull—will contain a 700 h.p. Beardmore heavy-oil engine, and although only three of these are now at Cardington, all are ready and have been put through their tests.

Perhaps the most interesting part of this airship is the accommodation arrangement, and this, on the occasion of our visit, was in an advanced stage of completion. Only some of the visitors were privileged "to go aboard" and make a hurried inspection of this part of "R.101" as our visit was but a short one and our party a large one, and only a few people at a time were allowed in the ship. However, those who did see the various quarters were very much impressed—especially as regards the Saloon Lounge. This is formed by an upper deck in the lower portion of the hull, measuring about 60 ft. by 30 ft. with promenades at the sides from which the passengers obtain an excellent view below through Triplex windows. Comfortable wicker seats and tables are arranged in this lounge, which is neatly decorated so that none of the hull structure is visible. In addition to the light from the windows, there are also clusters of electric lights.

On the same deck is the dining saloon, 32 ft. by 20 ft., capable of dining 50 passengers at a time, and 26 two-berth sleeping cabins each about 6 ft. 6 in. by 3 ft. 3 in.

Below all this is a lower deck which carries a small smoking room, the kitchen—which communicates with the dining saloon above by way of a lift—lavatories, and the quarters for the crew. At the forward end of this deck is the captain's control room, in front of which, and suspended beneath the hull, is the control car ; the wireless room is next to the control room.

Looking generally on this airship as it rested on its supports within the shed, only barely large enough to house it, one could not but be impressed ; even there one got a good idea of its immense size and clean and graceful lines. Gazing up through the hull at the maze of metal work—some thirty miles of steel tubing are embodied in the hull !—it seemed strange that such an apparently frail structure could embody all the refinements and requirements for long distance transport which we had seen and which, we hope, will soon successfully be fulfilled under actual flying conditions.

Late in the afternoon the inspection came to an all-too-early end—at least for some of us—and the party, which was in charge of the President of the Society, Col. the Master of Sempill, and which included several well-known personalities such as Maj. B. Baden-Powell, Foreign Naval, Military and Air Attachés, etc., adjourned for tea before the delightful drive home.

[" FLIGHT " Photograph

Sir Sefton Brancker, Director of Civil Aviation, receiving messages at Croydon Aerodrome, on May 23, sent by aircraft from the Continent expressing goodwill to the People's Dispensary for Sick Animals of the Poor. With him is Mrs. Dickin, Founder and Hon. Director of this society, and (right) Miss Anna May Wong, the Chinese Film Star.

King's Cup Air Race

A NEW turning point has now been added to the first section (flown July 5) of the King's Cup Air Race—particulars of which were published in FLIGHT for May 2 last. The new turning point will be at Hadleigh Aerodrome, so the course for this section will be—London (Heston); Norwich (Mousehold); Hadleigh; Hornchurch; Lympne; Hamble; Bristol; and Blackpool—a total distance of approximately 595 miles. The prizes for the race will be as follows: *First Prize.*—Cup presented by H.M. the King, and £250 presented by Sir Charles Wakefield. *Second Prize.*—£100 presented by Sir Charles Wakefield. *Third Prize.*—£50 presented by Sir Charles Wakefield. *Special Prize.*—£100, presented by Sir Charles Wakefield to the entrant of the aircraft which completes the course in the fastest time. In the Siddeley Trophy Tour, which will be flown simultaneously over the same course, a Second Prize of £25, presented by Mr. A. S. Butler, has been added.

Gipsy Engine Reliability Test

THE De Havilland Aircraft Co., Ltd., informs us that the Gipsy-Moth has now done 417 hrs. 50 mins. on its reliability test at an average speed of 88 m.p.h., and covered about 37,000 miles. The only replacement necessary was a magneto, otherwise the engine has had only routine external attention, such as recommended in the manufacturer's handbook. It should be pointed out, state the company, that the A.I.D sealed the engine and the company pledged themselves to give merely routine attention. Petrol consumption has worked out at 4½ gallons per hour, and a fortnight ago the oil consumption was 0·37 pints per hour. Lately it had risen to 0·4 pints per hour. This test is still proceeding, and a variety of pilots, including apprentices, who want to get in some flying, are sharing the task. The conspicuous points about the test are that the Gipsy engine can run 400 hours without a top overhaul, whilst the cost of replacements for 37,000 miles is that of one magneto.

FLIGHT Editorial Staff

AN opportunity occurs to join FLIGHT's Permanent Editorial Staff for one with a sound knowledge of aircraft and aero engines, and a capable technical draughtsman and free-hand artist. The Editor will be pleased to consider applications by letter, giving details of experience, etc.

PUBLICATIONS RECEIVED

U.S. National Advisory Committee for Aeronautics Reports: No. 296.—Pressure Distribution Tests on PW-9 Wing Models from −18° Through 90° Angle of Attack. By Oscar E. Loeser, Jr. *No.* 297.—The Reduction of Observed Airplane Performance to Standard Conditions. By W. S. Diehl. *No.* 298.—Effect of Variation of Chord and Span of Ailerons on Rolling and Yawing Moments in Level Flight. By R. H. Heald and D. H. Strother. *No.* 299.—Investigation of Damping Liquids for Aircraft Instruments. By G. H. Keulegan. *No.* 302.—Full Scale Tests on a Thin Metal Propeller at Various Tip Speeds. By Fred E. Weick. *No.* 305.—The Gaseous Explosive Reaction—A Study of the Kinetics of Composite Fuels. By F. W. Stevens. *No.* 306.—Full-Scale Wind-Tunnel Tests of a Series of Metal Propellers on a VE-7 Airplane. By Fred E. Weick. National Advisory Committee for Aeronautics, Washington, D.C., U.S.A.

The Royal Air Force Rifle Association Rules and Programme, 1929.—Royal Air Force Rifle Association, H.Q., No. 21 Group, West Drayton, Middlesex.

The Motor and Cycle Trades Benevolent Fund.—Rules, List of Members, etc., 1929. A. J. Wilson, 42, Bedford Row, London, W.C.1.

Die Sicherheit im Luftverkehr. By Erhard Milch. April, 1929. Deutsche Luft Hansa A.G., Mauerstr. 63-65, Berlin, W.8.

The World's Health. January-March, 1929. *Vol. X, No.* 1. 2, Avenue Velasquez, Paris. Price 2*s*.

The National Physical Laboratory Report for the Year, 1928. Department of Scientific and Industrial Research. H.M. Stationery Office, Kingsway, London, W.C.2. Price 9*s*. net.

NEW COMPANY REGISTERED

AERONAUTICAL TRUSTS, LTD.—Nominal capital £2, in 1*s*. shares. The objects are to act as trustees of, and take over and administer the "Wilbur Wright Memorial Fund," the "R.38 Memorial Fund," the "Usborne Memorial Lecture Fund," the "Edward Busk Memorial Lecture Fund," the "Herbert Akroyd Stuart Fund," and any other trust or memorial funds now existing, or to come into existence, which are, or may come under the control or management of Aerial Science, Ltd., of the Royal Aeronautical Society, with which is incorporated the Institution of Aeronautical Engineers, etc. The subscribers are:—W. Sempill (president, R.Ae.S.). M. L. Bramson (member of Council of R.Ae.S.). First directors shall be the persons who are the members of the Council of the Royal Aeronautical Society. The income and property of the company whencesoever derived, are to be applied solely towards the promotion of its objects. Solicitor: L. A. Wingfield, 61, Cheapside, E.C.2.

AERONAUTICAL PATENT SPECIFICATIONS

(*Abbreviations*: **Cyl. = cylinder; i.c. = internal combustion; m. = motor. The numbers in brackets are those under which the Specifications will be printed and abridged, etc.)**

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Published May 30, 1929

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3,290. A. P. THURSTON. Aircraft. (310,989)
4,611. F. H. ROYCE. Electrical turning gear for starting i.c. engines. (311,020.)
5,699. J. I. BRONN and CONCORDIA BERG-BAU-AKT.-GES. Airships. (287,082.)
7,109. BING WERKE VORM. GEB. BING AKT.-GES. Aircraft toy. (302,266).
18,239. BLACKBURN AEROPLANE AND MOTOR CO., LTD., and F. A. BUMPUS. Exhaust manifolds for aircraft engines. (311,134.)
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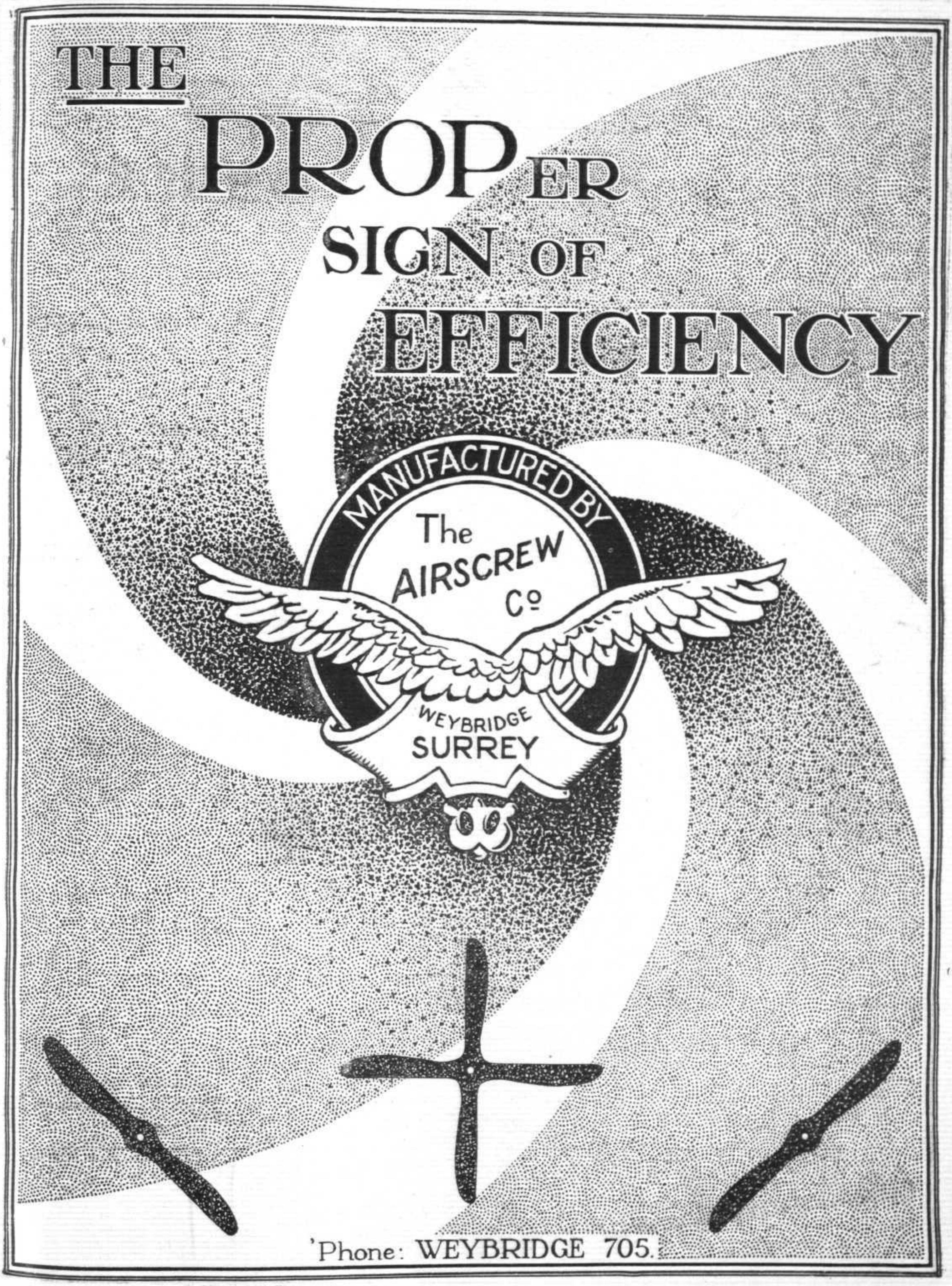
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